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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2000

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HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

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NOTE: Under Committee Rules, Mr. Young, as Chairman of the Full Committee, and Mr. Obey, as Ranking Minority Member of the Full Committee, are authorized to sit as Members of all Subcommittees.

JAMES D. OGSBURY, JEANNE L. WILSON, and DONALD M. MCKINNON,
Staff Assistants

PART 4

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Power Marketing Administrations	2621
Annual Performance Plan for FY 2000	2859

Printed for the use of the Committee on Appropriations

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DOE/CR-0060
Volume 1

Department of Energy
FY 2000 Congressional Budget Request

Atomic Energy Defense Activities

Weapons Activities

Other Defense Activities

February 1999

Office of the Chief Financial Officer

Volume 1

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The Department of Energy's FY 2000 Congressional budget justification will be available on the CFO homepage at http://www.cfo.doe.gov/budget/00budget/index.htm

(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy and Water Development Appropriations					
Energy supply	758,899	770,053	841,888	71,835	9.3%
Uranium supply & enrichment activities	—	—	—	—	—
Non-defense environmental management	483,454	431,200	330,934	-100,266	-23.3%
Uranium enrichment D&D fund	230,200	220,200	240,198	19,998	9.1%
Science	2,483,573	2,697,860	2,835,393	137,533	5.1%
Departmental administration	133,280	111,572	123,490	11,918	10.7%
Office of the inspector general	27,500	29,000	30,000	1,000	3.4%
Atomic energy defense activities:					
Weapons activities	4,146,692	4,400,000	4,531,000	131,000	3.0%
Defense environmental restoration & waste management	4,319,575	4,320,567	4,505,676	185,109	4.3%
Defense facilities closure projects	995,885	1,041,740	1,054,492	12,752	1.2%
Environmental management privatization	200,000	228,357	228,000	-357	-0.2%
Other defense activities	1,702,178	2,201,087	1,792,000	-409,087	-18.6%
Defense nuclear waste disposal	190,000	189,000	73,000	-116,000	-61.4%
Total, Atomic energy defense activities	11,554,330	12,380,751	12,184,168	-196,583	-1.6%
Power marketing administrations	243,619	237,510	199,947	-37,563	-15.8%
Federal energy regulatory commission	—	—	—	—	—
Nuclear waste disposal	156,000	169,000	297,000	128,000	75.7%
Geothermal resources development fund	—	—	-821	-821	—
Total, Energy and Water Development Appropriations	16,050,855	17,047,146	17,082,197	35,051	0.2%

(dollars in thousands)

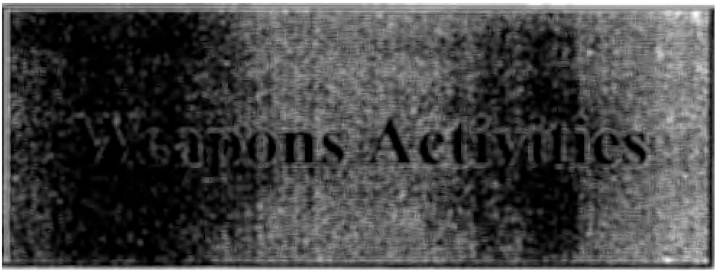
	FY 1998 Comparable Approp.	FY 1999 Comparable Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Interior and Related Agencies Appropnations					
Fossil energy research and development	356,517	384,056	364,000	-20,056	-5.2%
Alternative fuels production	-1,500	-1,300	-1,000	300	23.1%
Naval petroleum and oil shale reserves	107,000	14,000	—	-14,000	-100.0%
Elk Hills school lands fund	—	36,000	36,000	—	—
Energy conservation	584,354	627,701	837,515	209,814	33.4%
Economic regulation	2,725	1,801	2,000	199	11.0%
Strategic petroleum reserve	207,500	160,120	164,000	3,880	2.4%
Energy information administration	66,800	70,500	72,644	2,144	3.0%
Clean coal technology	-101,000	-40,000	-246,000	-206,000	-515.0%
Total, Interior and Related Agencies Appropnations	1,222,396	1,252,878	1,229,159	-23,719	-1.9%
Uranium enrichment D&D fund discretionary payments	-388,000	-398,088	-420,000	-21,912	-5.5%
Excess fees and recovenes, FERC	-10,159	-29,446	-28,342	1,104	3.7%
Colorado river basin	-16,098	-16,098	-21,000	-4,902	-30.5%
Total, Department of Energy	16,858,994	17,856,392	17,842,014	-14,378	-0.1%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Energy and Water Development Activities				
Energy Supply	1,536	1,629	1,331	-18.3%
Science	263	318	325	2.2%
Atomic Energy Defense Activities				
Weapons Activities	1,837	1,876	1,799	-4.1%
Environmental Restoration & Waste Mgmt	2,782	2,764	2,697	-2.4%
Other Defense Activities	846	736	964	31.0%
Total Atomic Energy Defense Activities	5,465	5,376	5,460	1.6%
Departmental Administration	1,258	1,302	1,303	0.1%
Inspector General	245	266	257	-3.4%
Power Marketing Administration	4,253	4,347	4,309	-0.9%
Federal Energy Regulatory Commission	1,318	1,320	1,320	-0.0%
Nuclear Waste Fund	202	197	196	-0.5%
Total, Energy & Water Development Activities	14,540	14,755	14,501	-1.7%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Intenor and Related Agencies				
Clean Coal Technology	61	67	60	-10.4%
Fossil Energy Research & Development	660	679	681	0.3%
Naval Petroleum & Oil Shale Reserves	59	54	39	-27.8%
Energy Conservation	419	441	426	-3 4%
Economic Regulation	22	17	16	-5.9%
Strategic Petroleum Reserve	132	135	125	-7.4%
Energy Information Administration	382	378	371	-1 9%
Total, Interior & Related Agencies Activities	1,735	1,771	1,718	-3.0%
Total, Department of Energy	16,275	16,526	16,219	-1.9%


Weapons Activities

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(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Weapons Activities					
Stockpile stewardship	1,869,213	2,125,882	2,286,200	160,318	7.5%
Stockpile management	2,031,487	2,071,512	1,998,300	-73,212	-3.5%
Program direction	248,600	249,600	246,500	-3,100	-1.2%
Subtotal, Weapons Activities	4,149,300	4,446,994	4,531,000	84,006	1.9%
Use of prior year balances	-2,608	-46,994	—	46,994	100.0%
Total, Weapons Activities	4,146,692	4,400,000	4,531,000	131,000	3.0%

Weapons Activities

Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction and acquisition of plant and capital equipment and other incidental expenses necessary for atomic energy defense weapons activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; [the purchase of not to exceed 1 fixed wing aircraft;] and the purchase of passenger motor vehicles (not to exceed [32] *3* for replacement only [,and one bus], [$4,400,000,000] *$4,531,000,000* to remain available until expended: [Provided, That funding for any ballistic missile defense program undertaken by the Department of Energy for the Department of Defense shall be provided by the Department of Defense according to procedures established for Work for Others by the Department of Energy.] *Further, for the foregoing purposes; $4,531,000,000, to become available October 1, 2000 and remain available until expended.* (Energy and Water Development Appropriations Act, 1999.)

Explanation of Change

Changes in the appropriation language include the number of vehicles required; a request for appropriations covering two years; and deletion of language pertaining to the ballistic missile defense system which does not need to be repeated annually.

Weapons Activities

Executive Budget Summary

Vision

High confidence in the safety, security, reliability and performance of the Nation's enduring nuclear weapon stockpile under a comprehensive test ban, utilizing a science-based approach to stockpile stewardship within a smaller, more efficient and cost effective weapons complex infrastructure.

Mission

The mission of Defense Programs is:

- to maintain indefinitely the safety, reliability and performance of the current nuclear weapons stockpile without nuclear testing;
- to maintain the capability to return to the design and production of new weapons and to underground nuclear testing, if so directed by the President; and,
- to dismantle excess weapons safely, and dispose of or store excess components.

Strategy

Rely on scientific understanding and expert judgement, rather than on nuclear testing and the development of new weapons, to predict, identify and correct problems affecting the safety, reliability or performance of the enduring stockpile. Carry out assessment and certification activities, analyzing and evaluating the effects of changes on warhead safety and performance. Develop and enhance surveillance capabilities for predicting and detecting problems. Develop advanced design and manufacturing capabilities necessary to refurbish stockpile warheads and certify new parts, materials and processes for the future. Retire and dismantle weapons as needed to meet arms control objectives. As new tools are developed and validated, incorporate them into a smaller, environmentally-sound, more flexible and agile weapons complex infrastructure for the future.

Policy Framework

In the early 1990's, as part of its continuing world leadership role in the arms control arena, the U.S. halted production of new nuclear warheads and conducted its last nuclear explosive test. Thus ended an era in which the U.S. modernized its nuclear weapon stockpile by continually replacing aging systems with new systems and in which nuclear testing served as the ultimate arbiter of the safety, reliability and performance of the Nation's nuclear weapon stockpile. With the decision to cease production of new nuclear warheads and end nuclear testing, the Nation faced the challenge of maintaining its existing nuclear weapon stockpile with other tools and different kinds of tests for the foreseeable future. In 1993 and 1994, the President and the Congress directed the Secretary of Energy to establish a stockpile stewardship program to ensure the preservation of the core intellectual and technical competencies of the United States in nuclear weapons.

In September 1994, the President approved the Nuclear Posture Review, which established requirements for the Department of Energy related to maintaining nuclear weapons infrastructure and capabilities, and ensuring tritium availability. The requirements for DOE were stated in terms of "infrastructure to support U.S. nuclear forces," delineated specifically as follows: maintain nuclear weapon capability (without underground nuclear testing); develop a stockpile surveillance engineering base; demonstrate the capability to design, fabricate and certify weapon types in the enduring stockpile; maintain the capability to design, fabricate, and certify new warheads; and ensure tritium availability. No production of new-design nuclear warheads is required. To meet these requirements, the Department of Energy developed the Stockpile Stewardship and Management Program. The strategies and key components of this approach were articulated initially in the May 1995 DOE report, *The Stockpile Stewardship and Management Program: Maintaining Confidence in the Safety and Reliability of the Enduring U.S. Nuclear Weapon Stockpile.*

In August 1995, the President announced that the United States would pursue a zero yield Comprehensive Test Ban Treaty (CTBT) as a means of reducing the danger posed by nuclear weapons proliferation. In September 1996, the United Nations General Assembly voted nearly unanimously to endorse the CTBT negotiated at the Geneva-based Conference on Disarmament. President Clinton signed the treaty on September 24, 1996, and submitted it to the Senate for ratification on September 23, 1997. One of the six safeguards that defines the United States' participation in the CTBT is the conduct of a stockpile stewardship program to ensure the safety and reliability of the weapons remaining in the nation's nuclear stockpile. In addition, the President requested a new annual certification process to certify that the stockpile is safe and reliable in the absence of underground nuclear testing, and to produce a statement about future confidence in the safety and reliability of the stockpile.

In January 1996, the Senate gave overwhelming approval to the START II Treaty; however, the Russian Duma has not ratified START II. The U.S. Senate's treaty ratification text highlighted the Nation's commitment to proceed with a robust stockpile stewardship program, to reestablish and maintain sufficient production capabilities and capacities, to maintain the U.S. nuclear weapons laboratories and the core competencies therein, to ensure rapid access to a new production source for tritium within the next decade, and to maintain the Nevada Test Site at a level which would enable timely resumption of underground nuclear testing if directed by the President.

In April 1996, the Secretary of Energy submitted to the Congress the first Stockpile Stewardship and Management Plan. The Plan was a roadmap of program activities needed to accomplish stockpile stewardship and management program goals. The document's first update was completed and sent to the Congress on October 28, 1997, and Defense Programs also issued a summary progress report on the program, *Stockpile Stewardship Program; Overview and Progress,* in October 1997. The second update was issued in April 1998, and the third update of the *Stockpile Stewardship Plan* is targeted for publication in support of the FY 2000 Congressional Budget Request.

The Department completed work on the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM/PEIS) in late 1996. On December 19, 1996, the Secretary of Energy signed the Record of Decision, enabling the DOE to proceed to construction on several key new experimental facilities, reestablish a limited pit manufacturing capability, and begin facility downsizing in FY 1998 where needed in accordance with anticipated future workload levels.

On June 18, 1997, the President signed the implementing Presidential Decision Directive (PDD) for the Fiscal Year 1997-2002 Nuclear Weapons Stockpile Memorandum. The President has declared United

States nuclear forces will maintain flexibility to both "hedge" against foreign political reversals (START I) as well as to "lead" through further reductions (START II). This strategy has been recognized in developing the programs and associated budget to meet these goals. This strategy is also supported in the Department's plans to transition the nuclear weapons complex from capacity-based to capability-based, while providing flexibility to support changing stockpile sizes.

On December 22, 1998, Secretary of Energy Bill Richardson made two key national security decisions related to the stockpile. He chose the use of Tennessee Valley Authority (TVA) reactors for producing tritium over construction of a new linear accelerator at Savannah River, and designated TVA's Watts Bar and Sequoyah reactors as the preferred facilities rather than paying for the completion of TVA's unfinished Bellefonte reactor. Secretary Richardson decided that Hanford's Fast Flux Test Facility should not play any role in producing tritium for the nation's stockpile and he outlined a course for deciding whether it should be restarted to serve future civilian research missions.

Secretary Richardson's announcement fulfills the Department's 1995 commitment to select by the end of 1998 between a commercial light water reactor and a linear accelerator as the primary source of tritium. Consistent with the Department's dual track strategy for tritium production, the linear accelerator option has been designated as a backup technology. As directed by the FY 1999 National Security Authorization Act, the Department will continue the dual track through FY 1999, and plans to complete key engineering, development and demonstration milestones for the accelerator by the end of 2002.

On December 11, 1998, Secretary Richardson signed the annual certification letter to the President (below) and on December 23, 1998, he signed the FY 1998-2003 Nuclear Weapons Stockpile Memorandum (NWSM). The NWSM was forwarded to the President on January 7, 1999. There will be no FY 1999 NWSM; rather, the current NWSM requires the FY 2000-2005 NWSM by September 30, 1999.

MEMORANDUM FOR THE PRESIDENT DEC 11 1998

SUBJECT: Nuclear Stockpile Certification

In response to your direction to conduct an annual certification of the nuclear weapons stockpile, we have thoroughly reviewed the safety and reliability of the stockpile under the Comprehensive Test Ban Treaty. The nuclear stockpile has no safety or reliability concerns that require underground testing at this time. Problems that have arisen in the stockpile are being addressed and resolved without underground nuclear testing to ensure the stockpile remains safe and reliable. In reaching this conclusion, we have obtained the advice of the Directors of the National Weapons Laboratories, the Commander in Chief, United States Strategic Command, and the Nuclear Weapons Council. We will continue to inform you annually on the safety and reliability of the nuclear weapons stockpile in the absence of underground nuclear testing, and in the context of the DOE's Stockpile Stewardship Plan.

Bill Richardson
Secretary of Energy

William S. Cohen
Secretary of Defense

Executed: December 22, 1998

Program Overview

Defense Programs carries out a single, highly integrated technical program for maintaining the safety and reliability of the U. S. nuclear stockpile that has evolved in response to this policy framework. The Stockpile Stewardship Program's overall goal is encompassed in the *DOE Strategic Plan (September 1997)* National Security Strategic Goal:

Support national security, promote international nuclear safety, and reduce global nuclear danger from weapons of mass destruction.

It is Defense Programs' mission to carry out this goal by providing high confidence in the safety, security, reliability and performance of the enduring U.S. stockpile without nuclear testing, ensuring the effectiveness of the U.S. nuclear deterrent while simultaneously supporting U.S. arms control and nonproliferation objectives. Defense Programs also provides the capabilities to resume U.S. underground nuclear testing and to reconstitute nuclear weapons production capacities, consistent with Presidential directives, the Nuclear Posture Review, and the START I treaty, should national security so demand in the future.

There are four national security objectives from the *DOE Strategic Plan* upon which this program and budget are based:

- Maintain confidence in the safety, reliability and performance of the nuclear weapon stockpile without nuclear testing.
- Replace nuclear testing with a science-based stockpile stewardship and management program.
- Ensure the vitality of DOE's national security enterprise.
- Reduce nuclear weapon stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.

Weapon designers and computational physicists partner to develop 3-dimensional simulation and modeling tools.

The **Stockpile Stewardship** activities address issues of assessing and maintaining confidence in stockpile safety and reliability without nuclear testing through a technically challenging science-based stockpile stewardship program utilizing upgraded or new experimental, computational and simulation capabilities. The programs are planned to meet the infrastructure requirements of the Nuclear Posture Review to maintain the vitality of the laboratories and the Nevada Test Site. Major initiatives continue in high energy density research with lasers, radiography, and pulsed power. Accelerated research and development in advanced computations to acquire and use data will improve predictive capabilities which will be the foundation of the science-based stewardship approach. Highly complex subcritical experiments are conducted using chemical high explosives to generate high pressure environments in which to study and obtain new data on nuclear weapon materials, such as plutonium. The Accelerated Strategic Computing Initiative (ASCI), a discrete element within the Stockpile Stewardship decision unit, provides the leading-edge, high end simulation capabilities needed to meet weapon assessment and certification requirements without nuclear testing. ASCI synergizes the resources of the national laboratories, computer industry, and academia to push the

development of hardware and advanced applications, and then introduces the new applications into the core programs.

To form the scientific basis of, and scientific validation for, the stewardship program, major new experimental facilities are also planned to expand and enhance the scientific base for stockpile stewardship. The National Ignition Facility, scheduled to be completed in 2003, will provide a means to study primary boosting, assess secondary performance and validate new physics models and codes while pursuing its goal to demonstrate thermonuclear ignition in the laboratory. The Dual-Axis Radiographic Hydrodynamic Test Facility, when completed in FY 2002, will provide an experimental capability to validate the implosion performance of nuclear weapons primaries. Technology development is underway for potential facilities to maintain the scientific capabilities needed in the future, and to assure that Defense Programs can continue to attract and retain the high quality personnel needed to make the scientific and technical judgements related to the safety and reliability of the stockpile in the absence of nuclear testing.

The **Stockpile Management** activities continue historical responsibilities to provide near-term and long-range support for the enduring stockpile, and to ensure an adequate supply of tritium. Along with stockpile surveillance, this includes normal maintenance, corrective maintenance and system refurbishment, as well as weapon dismantlement. The Stockpile Management decision unit funds initiatives in enhanced surveillance and advanced manufacturing, as well as the Stockpile Management Restructuring Initiative projects to downsize and modernize production capabilities needed for the future. The activities are supportive of the infrastructure requirements cited in the Nuclear Posture Review.

The DOE completed a PEIS for tritium production, and pursued a dual-track approach to research, development and engineering of potential future tritium supply technologies. After extensive review of the regulatory, cost, proliferation, environmental, technical and national security issues associated with each option, on December 22, 1998, Secretary Richardson chose to use commercial light water reactors owned by the TVA for producing tritium in the future. Engineering, development and demonstration and preliminary design of essential components of an accelerator for production of tritium will be supported as a backup technology.

Weapons **Program Direction** funds all federal personnel related costs, as well as support and contractual services for Federal employees. Other support costs are also included through FY 1999, such as a salary subsidy for the Los Alamos School District and payments for the Northern New Mexico Educational Enrichment Foundation. These activities more appropriately belong within a program decision unit, and beginning in FY 2000 are transferred to Stockpile Stewardship.

The major initiatives included in the Stockpile Stewardship Program are designed to assist in a rapid and effective transition from program activities optimized for the former underground nuclear testing era to a future program under the constraints of a CTBT. These initiatives are beginning to achieve their objectives, and as such, this budget reflects integration of some of these efforts into the ongoing base programs within this five year period.

In recognition of this progress, Defense Programs will consider proposing **budget structure** changes in the future. Although the current budget and accounting structure is meeting our needs today, and those of our contractors and customers in the Department, OMB and Congress, we are analyzing potential changes for the future ranging from changing the overall title of the appropriation to eliminating current decision units in favor of a single integrated account structure. We expect to study various options to

keep pace with the program's continuing evolution as discussed above, with organizational changes, and in response to ongoing implementation of the Government Performance and Results Act.

Maintaining the U.S. nuclear weapon stockpile in this new era will continue to challenge our best capabilities. The Stockpile Stewardship and Management programs must be implemented promptly and fully. In particular, new facilities and capabilities must be developed and validated while personnel with nuclear-test experience are still available. This program provides the framework and capabilities for success, although there are areas where challenges and risks are increasing at a rate that warrants continued vigilance.

Table 1

Weapons Activities Account Summary

(dollars in thousands)

	FY 1998 Current Approp.	FY 1999 Original Approp	FY 1999 Adjust-ment	FY 1999 Current Approp.	FY 2000 Request	$ Change	% Change
Operations and Maintenance	3,691,805	3,997,235	-67,783	3,903,452	3,991,076	87,624	2.2%
Construction	457,495	485,301	3,683	514,984	539,924	24,940	4.8%
Subtotal, Weapons Activities	4,149,300	4,482,536	-64,100	4,418,436	4,531,000	112,564	2.5%
PY Work Conducted in FY 1999	0	0	28,558	28,558	0	-28,558	-100.0%
Subtotal, Weapons Activities	4,149,300	4,482,536	-35,542	4,446,994	4,531,000	-84,006	-1.9%
Use of PY Balances	-2,608	-82,536	35,542	-46,994	0	46,994	100.0%
Total, Weapons Activities	4,146,692	4,400,000	0	4,400,000	4,531,000	131,000	3.0%

The FY 1999 appropriation totals $4.4 billion. The appropriations act authorized $4.482 billion, but provided only $4.4 billion in new budget authority with the difference to be made up by use of prior year balances. The Department plans to obligate $4.418 billion to new commitments in FY 1999. That level is a result of new appropriations of $4.4 billion, and reapplication of $18 million in prior year balances which were available with no adverse program impact. Also included in this amount is a reprogramming of $3.683 million approved in November 1998. The process to determine use of prior year balances to offset the Congressional reduction is discussed more fully later in this section. In addition, $28.6 million in prior year work has been carried over to be conducted in FY 1999, for a total planned obligational level of $4.447 billion. End of year FY 1998 unobligated balances associated with this work will be obligated in FY 1999, and as such are not available to be applied to the appropriation as discussed above.

The request for the FY 2000 program is $4.531 billion. This is consistent with the Administration's commitment that about $4.5 billion will be needed annually to adequately support the Stockpile Stewardship program. FY 2000 funding for the Tritium source programs is included within this level, and reflects the December 1998 decision on technology and schedule for the new tritium source.

Table 2

Decision Unit Summary

(dollars in thousands)

	FY 1998 Approp	FY 1999 Approp	Adjust-ments	FY 1999 Adjusted	FY 2000 Request	$ Change	% Change
Stockpile Stewardship	1,858,213	2,146,075	-32,193	2,115,882	2,286,200	170,318	8.1%
Stockpile Management	2,041,087	2,084,461	-31,907	2,052,554	1,998,300	-54,254	-2.6%
Program Direction	250,000	250,000	0	250,000	246,500	-3,500	-1.4%
Subtotal	4,149,300	4,482,536	-64,100	4,418,436	4,531,000	112,564	2.5%
Use of PY Balances	-2,608	-82,536	64,100	-18,436	0	18,436	-
Total, Weapons Activities Budget Authority	4,146,692	4,400,000	0	4,400,000	4,531,000	131,000	3.0%
Federal Staff (FTEs) [a]	1,837	1,876	0	1,876	1,799	-77	-2.2%

General

The FY 2000 budget request increases 3 percent over the FY 1999 appropriation. The increase is driven by an 8 percent increase in activities in the Stockpile Stewardship decision unit, principally related to simulation and modeling efforts in both ASCI and the core programs, and functional transfers of education-related activities into the decision unit from Program Direction. The Stockpile Management decision unit decreases 2.6 percent, due to reductions programmatic infrastructure. The budget request includes $170 million for tritium supply activities. The Program Direction decision unit decreases 1.4 percent, reflecting savings attributable to a smaller federal workforce.

The FY 2000 budget request supports initiatives begun during the past five years that are maturing and contributing the new tools and technologies needed for science based stewardship under the provisions of a CTBT. We are meeting our commitments to provide new and enhanced experimental facilities, and have accomplished significant downsizing and reorganizing of the Federal and contractor workforce to accomplish the mission in the future.

Stockpile Stewardship

Activities in the Stockpile Stewardship decision unit provide the physical and intellectual infrastructure required to meet the scientific and technical requirements of the Stockpile Stewardship Program, principally at the Lawrence Livermore, Los Alamos and Sandia National Laboratories and the Nevada Test Site. The programs provide the technical basis for confidence in the safety, reliability, and performance of the U.S. weapons stockpile in the absence of underground nuclear testing. The programs

[a] This FTE level represents a Departmental employment ceiling. Defense Programs anticipates a total employment level below the ceiling.

have been balanced to develop and maintain essential scientific and technical capabilities over the long term while meeting near term workload requirements and schedules. The Accelerated Strategic Computing Initiative (ASCI) and the Inertial Confinement Fusion (ICF), Technology Partnerships, Education, and Infrastructure Construction programs are included in the Stockpile Stewardship decision unit.

Stockpile Stewardship is requesting $2,286.2 million in FY 2000, an increase of $170.3 million or 8 percent over FY 1999. The funding increase is primarily due to increased requirements in the core programs to verify and validate new physics and materials models resulting from successful ASCI-sponsored efforts in advanced code development, and additional planned growth in ASCI and Stockpile Computing programs. Initiation of three new laboratory infrastructure projects will provide specialized space necessary for the advanced computers and associated capabilities. The increase also reflects the transfer of support for the Los Alamos Schools and the Northern New Mexico Educational Enrichment Foundation from the Weapons Program Direction account, and inclusion of funding for the new National Atomic Museum in Albuquerque, New Mexico.

The growth in the ASCI and Computations programs is about 12 percent from FY 1999 to FY 2000. This continues the momentum in both hardware development and acquisition to attain computers capable of sustained operations of 100 trillion operations per second (TeraOps) level by 2004, as well as in building 3-D computer codes which, in conjunction with the experimental programs in core stewardship and ICF, are aimed at providing the required levels of fidelity in weapons simulations. Two new computations initiatives begun in FY 1999 will continue in FY 2000. Distributed Computing at a Distance (DisCom^2) will enable the ASCI and Stockpile Computing program to deliver key computing and communications technologies that complement the ASCI vision, and the Numerical Environment for Weapons Simulations (NEWS) will create localized data exploration super corridors to support large-scale data analysis and assimilation tasks for researchers and weapons assessment teams.

A significant new item in the stewardship programs in FY 2000 is the advent of a laboratory infrastructure construction initiative. The goal is to provide for the infrastructure needs at the laboratories and the Nevada Test Site at about $100 million in annual investments over a 5-10 year period. Major programmatic facilities are not included in this effort; they will continue to be separately justified and funded within the R&D portions of the account. In the near term, the emphasis will be on construction of four facilities to provide the unique floor space needed at the laboratories to house the state of the art computers as well as provide visualization and other simulation capabilities to maximize the utility of the greatly enhanced computing capabilities by the weapon designers. A listing of candidate projects and associated cost estimates is included in the budget request.

Detailed discussion of the Stockpile Stewardship program activities is included in the following sections of the budget document.

Stockpile Management

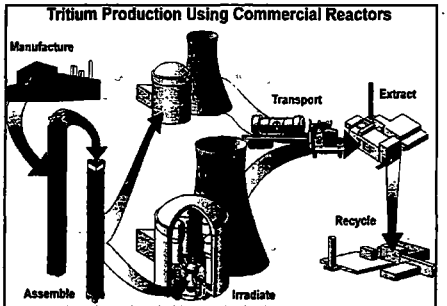
The Stockpile Management budget was formulated to maintain infrastructure essential for stockpile operations. Program activities support limited life component exchange; provide for stockpile surveillance/evaluation; support enhanced surveillance, directed weapon modifications and alterations supporting Stockpile Life Extension Program decision points; reestablish pit production capability and capacity; support commitments to entities external to Defense Programs, such as the DNFSB; support the Advanced Manufacturing Design and Production Technologies program and remaining ESP tasks consistent with Program Plans; and support the dismantlement of retired weapons. The Stockpile

Management request is $1,998.3 million, 2.6 percent below FY 1999. Small increases are included for Enhanced Surveillance, ADAPT, Radiological Nuclear Accident Response, Tritium and Materials. These increases are offset by decreases in the Core Management base program. Stockpile maintenance efforts will focus on limited life component exchange consistent with the START I stockpile, Life Extension for the W87, and alterations for the B61 and B83. Dismantlement work will focus on continuation of the W56 and W79, and start up activities for the B53 for projected dismantlement of approximately 375 weapons.

Pit Production efforts will continue to recapture required technologies at Los Alamos for the W88, B61-7 and W87. Fabrication of a limited number of W88 Trident II pits for certification and qualification continues on schedule with the goal of providing war-reserve pits for the stockpile in 2001.

Tritium Source

The $170 million funding request for the tritium source in FY 2000 is consistent with the December 22, 1998, secretarial decision which designated irradiation in a commercial light water reactor as the primary tritium production technology and production in a linear accelerator as backup.



Secretary Richardson selected tritium production in a commercial light water reactor as the primary approach for the new tritium source on December 22, 1998

Detailed discussion of the Stockpile Management program activities is included in the following sections of the budget document

Program Direction

The request for Program Direction funding decreases about 1.4% from the FY 1999 appropriated level, related to continued downsizing of the federal workforce. Federal support costs ($9.6 million) for the Amarillo, Kirtland and Kansas City Area Offices are relocated from the Stockpile Management decision unit into Program Direction to fully reflect the cost of Federal oversight performed by those offices. Funding for the Los Alamos School District and the Northern New Mexico Educational Foundation formerly included in this decision unit has been transferred to a more appropriate location in the Stockpile Stewardship Education programs in FY 2000.

Independent Assessments of Construction Projects

The conference report accompanying P.L. 105-245, Energy and Water Development Appropriations Act for FY 1999, stated that none of the funds provided for new FY 1999 construction project starts could be obligated until an independent assessment validating the cost and schedule for the specific project was completed and provided to the House and Senate Committees on Appropriations. This direction followed similar language in FY 1998 which directed external reviews of selected ongoing construction projects, but without the prohibition on release of funds.

The DOE assessment process is managed by the Office of Field Management (FM). The reviews are conducted by support service contractors, and FM coordinates DOE's response to review findings and recommendations as well as transmission of the reports to the congressional committees.

To date, six of eleven DP reports on ongoing projects resulting from the FY 1998 direction have been submitted to the Congress. Five assessments from this first group are still in process. There are nine reviews required as a result of the FY 1999 language. One review is near completion; the other eight are targeted to begin by February 1, 1999, with transmission to Congress targeted for early April, 1999. These delays have already affected FY 1999 budget execution and overall project schedules, and modifications are reflected in the FY 2000 budget.

In FY 1999, for projects in the Stockpile Stewardship decision unit, $15 million of the $25 million requested for new starts was provided in a single line, to be allocated to specific projects by the Department. The allocation of funding to the FY 1999 new starts and the project schedules reflected in the budget request is consistent with the schedule for completion of the assessments. To the extent that this schedule slips, or that projects are significantly changed by external review recommendations and corrective actions, we will keep the Congress fully and currently informed.

Use of Prior Year Balances

The appropriations conference report included language which directed that FY 1999 activities be funded using $4.4 billion in new budget authority and $82.5 million in prior year balances. To implement this guidance, Defense Programs undertook a rigorous process to examine prior year O&M balances reported at the end of FY 1998. This task was made even more difficult by the fact that **overall ending net FY 1998 uncosted balances for Defense Programs were $160 million below the Department's goal for operations and maintenance activities.** Using DP's Financial Information Variance Reporting (FIVR) system, the FY 1998 end of year accounting data at the lowest level and the Department's threshold goal for appropriate levels of uncosted balances, DP Headquarters, field and contractor organizations analyzed and rejustified any individual uncosted balances in excess of the Department of Energy's thresholds of 13% for operating expenses and 50% for capital equipment and general plant projects, and all unobligated balances (including construction) reported at the end of the year. As a result of this process which examined about $125 million in potentially available balances, only about $6.3 million in uncosted balances and $8.5 million in unobligated balances could be deobligated/reobligated without unacceptable impact on programs authorized and funded in prior years. This $14.8 million can be reobligated to fund the FY 1999 program in addition to the $4.4 billion in new budget authority, making a total of $4.414 billion available for the FY 1999 program, rather than $4.482 as outlined in the appropriation. (A congressional reprogramming request was also approved in November 1998 which revises the total FY 1999 appropriation to $4.418 million.)

This reduced FY 1999 funding level will have negative program impacts; details are still being assessed by Defense Programs program managers and by contractor personnel at the laboratories and plants. To arrive at the current program and site allocations, DP accommodated all congressional direction on FY 1999 programmatic and site funding first and then assessed the $82.5 million funding reduction proportionally to each DP organization. Available prior year balances were reobligated in the programs where they were identified. We will continue to examine our activities to determine whether additional prior year balances may become available later in the fiscal year to increase the $4.418 billion total currently available for FY 1999 activities.

Surplus Facilities and Nuclear Materials

The historical development of the nuclear weapons program and the end of the Cold War resulted in a weapons complex that was much larger and more diverse than needed for the future mission. Major portions of the complex have already been transferred to the Office of Environmental Management

(EM). Yet, as DP continues to consolidate and otherwise adjust the size of the complex to meet future needs, many more facilities and nuclear materials have and will become excess to national security needs.

Due to their hazardous nature, these facilities and materials require significant expenditures to assure safety, security and environmental protection. These expenditures will continue to be required until the hazards are removed through deactivation, decommissioning and decontamination activities. If DP is unable to transfer the excess facilities and materials without having to invest large sums, the financial burden will increase over time thereby resulting in decreased funding for DP's core mission.

For the FY 2000 budget and beyond, Defense Programs makes the following three assumptions regarding disposition of surplus facilities and nuclear materials:

(1) Beginning in FY 2002, DP will be able to transfer its contaminated excess facilities, including any excess nuclear materials remaining therein, to EM for deactivation, decommissioning and decontamination.

(2) DP further assumes that given two years notice of intent to transfer surplus facilities and nuclear materials, EM will accept such facilities and nuclear materials in "as is" condition. In doing so, EM will budget for and manage the cleanup and disposal of such facilities and nuclear materials.

(3) In FY 2001, DP will transfer responsibility for Building 3019 at the Oak Ridge National Laboratory to EM.

Table 3

Site Funding Estimates

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	270,972	252,001	222,749	-29,252	-11.6%
Kansas City Plant	297,487	295,972	288,067	-7,905	-2.7%
Los Alamos National Laboratory	772,312	883,529	908,763	25,234	2 9%
Pantex Plant	259,912	260,759	241,266	-19,493	-7.5%
Sandia National Laboratories	683,610	749,136	774,251	25,115	3.4%
Subtotal, Albuquerque Ops Office	2,284,293	2,441,397	2,435,096	-6,301	-0 3%
Chicago Operations Office	7,164	14,192	10,159	-4,033	-28.4%
Idaho Operations Office	19,310	5,446	384	-5,062	-92 9%
Nevada Operations Office	243,045	257,791	256,531	-1,260	-0 5%
Oak Ridge Operations Office					
Oak Ridge Y-12	449,183	420,451	379,961	-40,490	-9.6%
OR Institute for Science & Ed	15,206	13,487	13,287	-200	-1 5%
OR Science & Technology Institute	149	147	150	3	2.0%
Oak Ridge National Laboratory	17,409	17,970	18,508	538	3.0%
Oak Ridge Operations Office	17,612	17,819	12,488	-5,331	-29.9%
Subtotal, Oak Ridge Operations Office	499,559	469,874	424,394	-45,480	-9.7%
Oakland Operations Office					
General Atomics	10,937	8,870	7,000	-1,870	-21.1%
Lawrence Berkeley Laboratory	6,374	15,112	23,018	7,906	52 3%
Lawrence Livermore National Laboratory	742,259	815,590	852,081	36,491	4 5%
Naval Research Laboratory	9,000	16,758	9,500	-7,258	-43 3%
Oakland Operations Office	16,080	18,810	18,570	-240	-1.3%
University of Rochester	26,349	28,850	30,500	1,650	5 7%
Subtotal, Oakland Operations Office	810,999	903,990	940,669	36,679	4.1%
Richland Operations Office					
Pacific Northwest Laboratory	26,040	24,086	14,960	-9,126	-37.9%
Richland Operations Office	21,569	347	393	46	13.3%

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Subtotal, Richland Operations Office	47,609	24,433	15,353	-9,080	-37.2%
Savannah River Operations Office					
Savannah River Operations Office	8,355	8,827	9,701	874	9.9%
Savannah River Westinghouse	150,996	151,849	129,276	-22,573	-14.9%
Subtotal, Savannah River Operations Office	159,351	160,676	138,977	-21,699	-13.5%
Headquarters	77,970	140,637	309,427	168,800	120.0%
Subtotal, Weapons Activities	4,149,300	4,418,436	4,531,000	112,564	2.5%
Use of PY Balances	-2,608	-18,436	0	18,436	100.0%
Total, Weapons Activities	4,146,692	4,400,000	4,531,000	131,000	3.0%

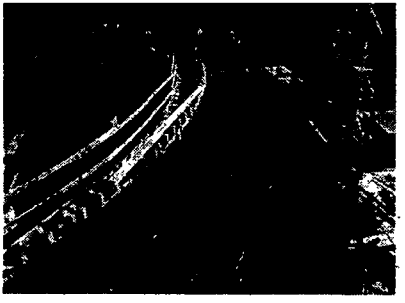
Following are brief site descriptions; more detailed information about Defense Programs' sites and facilities is located in each of the following decision units.

Los Alamos National Laboratory (LANL)

LANL is a multidisciplinary research facility located in northern New Mexico, engaged in a variety of programs for DOE and other government agencies. While the primary mission is defense programs, LANL supports other programs including: arms control, nonproliferation, nuclear material disposition, energy research, science and technology, and environmental management. Research and development at LANL in the basic sciences, mathematics, and computing have application to a broad range of activities including: national security, nonnuclear defense, nuclear and nonnuclear energy, atmospheric and space research, geoscience, bioscience, biotechnology, and the environment. Activities in both the Stockpile Stewardship and Stockpile Management decision units are carried out at LANL.

Lawrence Livermore National Laboratory (LLNL)

LLNL is a multidisciplinary research facility located in Livermore, California, engaged in a variety of programs for DOE and other government agencies. While the primary mission is defense programs, LLNL supports other programs including: arms control, nonproliferation, nuclear material disposition, energy research, science and technology, and environmental management. Research and development at LLNL in the basic sciences, mathematics, and computing have application to a broad range of activities including: national security, nonnuclear defense, nuclear and nonnuclear energy, atmospheric and space research, geoscience, bioscience, biotechnology, and the environment.



National Ignition Facility at LLNL - Reinforcing steel in place for the 12 foot thick target bay wall (October 1998).

Activities in both the Stockpile Stewardship and Stockpile Management decision units are carried out at LLNL.

Sandia National Laboratories (SNL)

SNL is a multidisciplinary research facility engaged in a variety of programs for DOE and other government agencies. Sandia has two principal locations: Albuquerque. New Mexico and Livermore, California. While the primary mission is defense and related programs, SNL conducts R&D activities in advanced manufacturing, electronics, information, pulsed power, energy, environment, transportation, and modeling and simulation-based life cycle engineering. Activities in both the Stockpile Stewardship and Stockpile Management decision units are carried out at SNL.

Kansas City Plant (KCP)

The Kansas City (Missouri) Plant is the main facility in the nuclear weapons complex for the manufacture and procurement of nonnuclear components for nuclear weapons, including electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal. The broad range of components and devices procured from U.S. industry is supported by an extensive system to qualify suppliers and accept products. The Kansas City Plant primarily supports activities in the Stockpile Management decision unit.

Pantex Plant (PXP)

The Pantex Plant, located near Amarillo, Texas, is the only facility in the nuclear weapons complex for quantity assembly\disassembly of nuclear weapons. Also, plutonium pits from dismantled weapons are stored at Pantex. The site has been designated as the permanent location for strategic reserve pit storage and the interim storage location for surplus pits resulting from dismantlement activities and the planned closure of the Rocky Flats Site. Pantex fabricates high explosives used in nuclear weapons and performs modifications and surveillance of nuclear weapons scheduled to remain in the future stockpile. The Pantex Plant primarily supports activities in the Stockpile Management decision unit.

Y-12 Plant (Y-12)

The Y-12 Plant in Oak Ridge, Tennessee, maintains the only capability in the nuclear weapons complex to fabricate quantity uranium and lithium components and parts for nuclear weapons, including secondaries and radiation cases. In addition, Y-12 has historically stored highly enriched uranium (HEU) and lithium for the nuclear weapons complex and Y-12 is now designated the permanent location for the storage of strategic reserves of these materials. The Y-12 Plant primarily supports activities in the Stockpile Management decision unit.

Savannah River Site (SRS)

The primary DP mission at the SRS in Aiken, South Carolina, is the recycling of tritium from the weapons stockpile and the loading and surveillance of tritium reservoirs. Formerly, this location was the site for production of special nuclear materials, however these capabilities have been closed down and the site is undergoing environmental restoration. The tritium loading infrastructure at SRS primarily supports activities in the Stockpile Management decision unit.

Nevada Test Site (NTS)

The core DP mission at the NTS is to maintain the capability to conduct an underground nuclear test within 2-3 years as required by Presidential Directive and by Safeguard C accompanying the

Comprehensive Test Ban Treaty. DOE is involved in a number of other activities at NTS including hazardous liquids spill testing, solar technology demonstration, radioactive and mixed waste disposal, and the Yucca Mountain characterization programs. The Nevada Test Site supports activities in both the Stockpile Stewardship and Stockpile Management decision units.

Table 4

Federal Employment Estimates

(FTEs)

	FY 1998	FY 1999	FY 2000
Albuquerque Operations Office	1,109	1,151	1,122
Nevada Operations Office	253	259	238
Oakland Operations Office	80	82	84
Oak Ridge Operations Office	64	64	58
Savannah River Operations Office	32	33	33
Headquarters	299	287	264
Total Weapons Federal Employment (DOE Estimated FTEs)	1,837	1,876	1,799

This FTE level represents a Departmental employment ceiling. Defense Programs anticipates a total employment level below the ceiling.

Strategic Alignment Initiative

Onboard staffing for Defense Programs at the time of transmission of the 120-Day Study to the Congress in June 1997 was 1,992. Defense Programs reached its FY 1998 Strategic Alignment Initiative (SAI) end of year staffing level of 1,895 by the end of January 1998. Of the approximately 100 separations required to meet the FY 1998 SAI staffing level, Headquarters provided about 50, including 17 involuntary separations. The field provided its share of 50 separations through voluntary actions; no involuntary actions occurred in the field during FY 1998. Defense Programs ended FY 1998 with an actual staffing level of 1,787.

New SAI targets were received in May 1998 which reduced DP's allocation by an additional 86 in FY 1998 (1,895 to 1,809) and 65 in FY 1999 (1,876 to 1,811) and adjusted the FY 2000 target to 1,782 in recognition of DP's successful staff reduction efforts. Actual FY 2000 end of year on board staffing is currently estimated at 1,746, although that estimate and DP's SAI target may be adjusted based upon the results of the Secretary's ongoing Workforce 21 initiative to review critical skills and workforce imbalances throughout DOE.

Table 5

Detailed Program Funding Summary

(dollars in thousands)

	FY 1998 Approp	FY 1999 Adjusted	FY 2000 Request	$ Change	% Change
Stockpile Stewardship					
Core Stewardship O&M	907,015	969,576	1,092,855	123,279	12.7%
Construction	59,700	42,400	61,000	18,600	43.9%
Subtotal, Core Stewardship	966,715	1,011,976	1,153,855	141,879	14.0%
ASCI/Computations O&M	374,089	483,726	542,500	58,774	12.2%
Inertial Confinement Fusion O&M	215,654	219,182	217,600	-1,582	-0.7%
Construction	197,800	284,200	248,100	-36,100	-12.7%
Subtotal, ICF	413,454	503,382	465,700	-37,682	-7.5%
Technology Partnerships/Education O&M	64,845	52,072	52,000	-72	-.1%
Infrastructure Construction	39,110	64,726	72,145	7,419	0
Subtotal, Stewardship	1,858,213	2,115,882	2,286,200	170,318	8.1%
Stockpile Management					
Core Management O&M	1,418,823	1,522,754	1,457,321	-39,443	-2.6%
Construction	83,370	97,658	94,679	-2,979	-3.1%
Subtotal, Core Management	1,502,193	1,620,412	1,552,000	-68,412	-4.2%
Enhanced Surveillance O&M	48,714	81,511	85,290	3,779	4.6%
ADAPT O&M	90,098	79,520	85,000	5,480	6.9%
Radiolog/Nuc Response O&M	78,808	76,200	77,600	1,400	1.8%
Tritium Source O&M	183,340	141,000	106,000	-35,000	-24.8%
Tritium Construction	77,515	26,000	64,000	38,000	0.0%
Subtotal, Tritium Source	260,855	167,000	170,000	3,000	1.8%
Materials O&M	60,419	27,911	28,410	499	1.8%
Subtotal, Management	2,041,087	2,052,554	1,998,300	-54,254	-2.6%
Program Direction O&M	250,000	250,000	246,500	-3,500	-1.4%
Subtotal, Weapons Activities	4,149,300	4,418,436	4,531,000	112,564	2.5%
Use of PY Balances	-2,608	-18,436	0	18,436	100.0%
Total, Weapons Activities	4,146,692	4,400,000	4,531,000	131,000	3.0%

Table 6

Construction Project Summary

(Dollars in thousands)

	TEC	Prior Years	FY 1998	FY 1999	FY 2000	Outyears
Stockpile Stewardship						
00-D-103, Terascale Simulation Facility, LLNL	83,500	0	0	0	8,000	75,500
00-D-105, Strategic Computing Complex, LANL	100,000	0	0	0	26,000	74,000
00-D-107, Joint Computational Engineering Laboratory (JCEL), SNL	28,870	0	0	0	1,800	27,070
99-D-102, Rehabilitation of Maintenance Facility, LLNL	7,900	0	0	4,000	3,900	0
99-D-103, Isotope Sciences Facilities, LLNL	17,400	0	0	2,000	2,000	13,400
99-D-104, Protection of Real Property (Roof Reconstruction, Ph. II), LLNL	19,900	0	0	2,500	2,400	15,000
99-D-105, Central Health Physics Calibration Facility, LANL	3,900	0	0	2,900	1,000	0
99-D-106, Model Validation & Systems Certification Test Center, SNL	18,230	0	0	1,600	6,500	10,130
99-D-108, Renovate Existing Roadways, NV	11,005	0	0	2,000	7,005	2,000
97-D-102, Dual-Axis Radiographic Hydrotest Facility (DARHT), LANL	259,700	81,400	46,300	36,000	61,000	35,000
96-D-102, Stockpile Stewardship Facilities Revitalization, Phase VI, VL	74,226	21,770	19,810	24,106	2,640	5,900
96-D-103, Atlas, LANL	43,300	23,500	13,400	6,400	0	0
96-D-104, Processing & Engineering Technology Laboratory (PETL), SNL	45,900	16,080	0	18,920	10,900	0
96-D-105, Contained Firing Facility Addition, LLNL	49,700	23,700	19,300	6,700	0	0
96-D-111, National Ignition Facility (NIF), LLNL	1,045,700	169,300	197,800	284,200	248,100	146,300
Total, Stockpile Stewardship Construction	1,809,231	335,750	296,610	391,326	381,245	404,300

continued

(dollars in thousands)

	TEC	Prior Years	FY 1998	FY 1999	FY 2000	Outyears
Stockpile Management						
99-D-122, Rapid Reactivation, VL	22,900	0	0	11,200	11,700	0
99-D-123, Replace Mechanical Utility Systems, Y-12	4,330	0	0	1,900	0	2,430
99-D-125, Replace Boilers & Controls, KC	14,000	0	0	1,000	0	13,000
99-D-127, SMRI - Kansas City Plant II	119,500	0	0	13,700	17,000	88,800
99-D-128, SMRI -Pantex Consolidation	13,218	0	0	1,108	3,429	8,681
99-D-132, Nuclear Materials S&S Upgrades Project, LANL	60,746	0	0	9,700	11,300	39,746
98-D-123, SMRI - Tritium Facility Modernization & Consolidation, SR	98,400	0	11,000	27,500	21,800	38,100
98-D-124, SMRI - Y-12 Consolidation	24,800	0	6,450	10,700	3,150	4,500
98-D-125, Tritium Extraction Facility, SR	285,650	0	9,650	6,000	33,000	237,000
98-D-126, APT, LANL	144,865	0	67,865	20,000	31,000	26,000
97-D-122, NMSF Renovation, LANL	22,364	4,000	9,200	2,500	0	6,664
97-D-123, Structural Upgrades, KC	18,000	1,400	0	6,400	4,800	5,400
97-D-124, Steam Plant Wastewater Treatment Facility Upgrade, Y-12	2,500	600	1,900	0	0	0
96-D-122, Sewage Treatment Upgd, PX	11,300	700	6,900	3,700	0	0
96-D-123, HVAC & Chillers, Y-12	12,800	10,100	2,700	0	0	0
95-D-102, CMR Upgrades Prj, LANL	174,100	67,740	5,000	5,000	18,000	78,360
95-D-122, Sanitary Sewer Upgd, Y-12	32,000	19,400	12,600	0	0	0
94-D-124, Hydrogen Fluoride Supply System, Y-12	26,300	24,900	1,400	0	0	0
94-D-125, Upgrade Life Safety, KC	14,700	12,700	2,000	0	0	0
93-D-122, Life Safety Upgrades, Y-12	29,200	23,850	2,100	3,250	0	0
92-D-126, Emerg'y Notif'n System, VL	28,800	17,100	3,200	0	0	8,500
88-D-122, FCAP, VL	398,724	379,804	18,920	0	0	0
88-D-123, Security Enhance Project, PX	131,200	125,000	0	0	3,500	2,700
Total, Stockpile Management Con.	1,690,397	687,294	160,885	123,658	158,679	559,881
Total, Weapons Activities Construction	3,499,628	1,023,044	457,495	514,984	539,924	964,181

Program Performance Measures

The Strategic Objectives, Strategies and Performance Measures from the September 1997, Department of Energy Strategic Plan are the basis for this budget request. The following four national security strategic objectives will be accomplished as a result of carrying out the supporting activities detailed in this budget justification.

- NS-1 Maintain confidence in the safety, reliability, and performance of the nuclear weapons stockpile without nuclear testing.
- NS-2 Replace nuclear testing with a science-based Stockpile Stewardship and Management Program.
- NS-3 Ensure the vitality of DOE's national security enterprise.
- NS-4 Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.

The FY 2000 Performance Plan and the FY 1999 Performance Agreement with the Secretary are highlighted later in this document.

Victor H. Reis
Assistant Secretary for Defense Programs

1/15/99
Date

Defense Programs Performance Measures for FY 2000

Following is a listing of each National Security Strategic Plan objective, and the accompanying strategies and performance measures for Defense programs focused on FY 2000. "Other" is indicated for funding associated with activities supporting a strategy, but not encompassed within the specific performance measures listed for that strategy.

Objective 1: Maintain confidence in the safety, reliability, and performance of the nuclear weapons stockpile without nuclear testing.

Strategy 1: Extend the life of U. S. nuclear weapons by continuing the Stockpile Life Extension Program and Stockpile Maintenance activities.

Performance Measures:

A. Meet all annual weapon alteration and modification schedules developed jointly by DOE and DoD.

B. Conduct studies and development work required to support weapon systems and components for the future stockpile.

Strategy 2: Improve detection and prediction capabilities for assessing nuclear weapon component performance and the effects of aging.

Performance Measure:

A. Adhere to schedules set forth in the Enhanced Surveillance Program Plan for activities that enhance knowledge of weapon-relevant physical processes affecting aging and operation of weapon components.

Strategy 3: Continually evaluate the safety, reliability, and performance of the nuclear weapons stockpile.

Performance Measures:

A. Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapons stockpile.

B. Revalidate enduring stockpile systems to meet established military characteristics.

C. Undertake an independent assessment of the Stockpile Stewardship Program and its implementation throughout the DP national security enterprise.

Strategy 4: Provide a reliable source of tritium for the nuclear weapons stockpile.

Performance Measure:

A. Begin implementation of the selected technology and backup to provide a reliable source of tritium.

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Objective 2: Replace nuclear testing with a science-based Stockpile Stewardship and Management Program

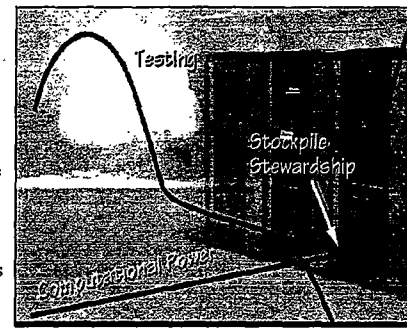
Strategy 1: Develop the advanced simulation and modeling technologies and computational tools necessary to confidently mitigate the loss of underground nuclear testing.

Performance Measures:

A. Provide computer platforms sized to support the stewardship objective of full physics, high fidelity simulations of nuclear weapons performance.

B. Deliver three-dimensional high fidelity weapons performance codes by 2004.

C. Demonstrate a computer code capable of performing a three-dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an ASCI computer system.



Growth in computations needed for the change from a test-based to a science-based stockpile stewardship program

D. Develop and implement visualization, networking and data management systems to efficiently support utilization of ASCI codes and computers across the weapons complex.

Aerial view of the NIF construction site, October 1998

Strategy 2: Develop new nuclear weapons physics experimental test capabilities.

Performance Measures:

A. Continue construction of the National Ignition Facility according to its Project Execution Plan schedules.

B. Meet all cost and schedule goals for construction of the Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) consistent with an FY 2002 completion.

C. Meet all cost and schedule goals for construction of the Contained Firing Facility at LLNL consistent with a 4th quarter FY 2001 completion.

D. Meet all cost and schedule goals for construction of the Atlas facility at LANL consistent with a 1st quarter FY 2001 completion.

E. Obtain and assess information required to decide whether to construct 1) an advanced hydrotest facility and/or 2) an advanced pulsed power facility.

Strategy 3: Advance our understanding of the fundamental characteristics of weapons behavior through weapon systems engineering and advanced experiments to support future assessments of weapons safety, reliability, and performance.

Performance Measures:

A. Conduct two subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon.

B. Conduct experimental and theoretical research necessary to maintain or advance research, development and engineering capabilities in nuclear materials science and weapons design.

C. Conduct high energy density research on inertial confinement fusion facilities necessary to enhance understanding of areas of physics relevant to a better predictive assessment of nuclear weapons performance.

Objective 3: Ensure the vitality of DOE's national security enterprise

Strategy 1: Provide an appropriately-sized, cost-effective, safe, secure, and environmentally sound national security enterprise.

Performance Measures:

A. Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan are operational.

B. Meet the established schedules for downsizing and modernizing our production facilities.

C. Adhere to schedules set forth in the Advanced Manufacturing, Design and Production Technology Multi-Year Program Plan.

D. Meet schedules to rebuild, qualify and certify Trident II pits by FY 2001 and develop intermediate pit production capability of 20 pits per year at the Los Alamos National Laboratory by 2007.

Other transportation and logistics capabilities.

Strategy 2: Ensure that sufficient scientific and technical personnel are available to meet DOE's long-term national security requirements.

Performance Measures:

A. Establish strategic alliances and collaborations among the weapons laboratories, industries, and universities to enable effective use of scientific and technical personnel throughout the R&D community.

B. Implement the Strategic Alignment Initiative and recommendations of the 120-Day Study.

Strategy 3: Ensure and enhance protection of nuclear materials, sensitive information, and facilities.

Performance Measures:

A. Continue material protection, control, and accountability upgrades at three DOE facilities with weapons-usable material.

B. No loss of U.S. origin nuclear materials in the U.S. and abroad from theft, loss, or illicit trafficking.

Strategy 4: [Strategy 4 does not receive direct Defense Programs support]

Strategy 5: Maintain test readiness and maintain and enhance emergency response and management capabilities to address any nuclear weapons, radiological or other emergency in the U.S. or abroad.

Performance Measures:

A. Ensure that the capability to resume underground nuclear testing is maintained, in accordance with the Presidential Decision Directive and Safeguard C of the CTBT.

B. Maintain robust emergency response assets in accordance with Presidential Decision Directive 39, the Atomic Energy Act, Executive Order 12656 and Federal Emergency Plans.

C. Continue ongoing efforts of exercises, training and drills to improve response readiness to any possible weapons of mass destruction (WMD) and terrorist threat contingency using upgraded diagnostics and new equipment.

Objective 4: Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.

Strategy 1: Dismantle nuclear warheads that have been removed from the U.S. nuclear weapons stockpile in a safe and secure manner.

Performance Measure:

A. Adhere to schedules for the safe and secure dismantlement of approximately 375 nuclear warheads that have been removed from the U.S. nuclear weapons stockpile.

Defense Programs FY 1998 Performance Agreement

(dollars in millions)

FY 1998 Performance Measure	Final Status	Budget Reference [a]	FY 1998 Estimate
Meeting all DoD annual weapons alteration, modification and surveillance schedules.	Successful	1 1	718
Certifying nuclear weapon stockpile safety, reliability and performance according to DOE/DoD procedures	Fully Successful	1 3 a 1.3 b	336
Completing the analysis to support the selection, by December 1998, of a new source for tritium.	Successful	1.4.a/b	261
Meeting established schedules for the development and installation of a 3-trillion operations per second computer system	Fully Successful	2 1 b	71
Beginning the physical construction according to schedules in the Project Execution Plan for the National Ignition Facility	Fully Successful	2.2 a	282
Conducting 3 or 4 subcritical experiments to provide information about the behavior of nuclear materials during the implosion phase of a nuclear weapon	Partially Successful	2.3.a	86
Ensuring that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT through a combined expenmental and test readiness program	Fully Successful	3.5 a	122
Maintaining robust emergency response assets in accordance with Presidential Decision Directive 39, the Atomic Energy Act and executive Order 12656 to ensure Departmental response to any nuclear weapons or radiological emergency in the United States or abroad.	Fully Successful	3.5.b/c	77
Adhering to schedules for the safe and secure dismantlement of approximately 1,000 nuclear warheads that have been removed from the U.S. nuclear weapon stockpile	Fully Successful	4.1.a	190
Assuring that all facilities required for successful achievement of the Stockpile Stewardship and Management Plan are operational, and that schedules for downsizing and modernizing facilities are met.	Partially Successful	3 1.a&b	432

[a] FY 1999 Congressional Budget Request; Listing of performance measures, Objective N, Strategy N, Performance Measure a-e

(The following Performance Agreement Status document is an excerpt from the Department of Energy SOLOMON Database)

U.S. Department of Energy

FY 1998 PERFORMANCE AGREEMENT STATUS

Agreement Status Details
Data as of 12-Jan-99

NATIONAL SECURITY

NS 1-1 MAINTAINING THE ENDURING STOCKPILE

Status: Successful

Description: Extend the life of U.S. nuclear weapons by continuing the Stockpile Life Extension Program and Stockpile Maintenance activities. Improve detection and prediction capabilities for assessing nuclear weapon component performance and the effects of aging, and continually evaluate the safety, reliability, and performance of the nuclear weapons stockpile.

Success will be measured by:

Certifying nuclear weapons stockpile safety, reliability, and performance according to DOE/DoD procedures.

Analysis: The establishment of an annual process for the review and certification of the safety and reliability of the nuclear weapons stockpile was directed by President Clinton and is crucial to this Nation's pursuit of the Comprehensive Test Ban Treaty. The Secretaries of Defense and Energy must advise the President each year whether the nuclear stockpile has any safety or reliability concerns that require underground testing. In reaching their conclusion they are advised by the Directors of DOE's national weapons laboratories, the Commander of the U.S. Strategic Command, and the joint Nuclear Weapons Council.

Two annual certifications have been successfully completed, the latest submitted to Congress by the President on February 12, 1998.

The DOE portion of the 3rd Annual Certification was completed on July 31, 1998. Final 1998 DOE laboratory reports reviewing the status of the nine types of warheads in the enduring stockpile were published during July 1998, and signed out by Defense Programs for distribution to the members of the Nuclear Weapons Council Standing and Safety Committee for their use in preparing the 3rd NWC Annual Stockpile Certification report. *(The third annual certification letter was signed by the Secretaries of Defense and Energy on December 11, 1998, and executed on December 22, 1998.)*

Status: Fully Successful

Meeting all DoD annual weapons alteration, modification and surveillance schedules.

Analysis: Surveillance activities are required to properly assess the safety and reliability of weapons in the Nation's stockpile. Surveillance includes both tests on weapon components at DOE's nuclear weapons laboratories and flight tests of unarmed weapons to examine delivery performance. During Fiscal Year 1998, the Department completed 40 of the 45 planned flight tests and 82 of the planned 100 laboratory tests. The flight test shortfall was due to logistics issues between the DoD and DOE. The laboratory test shortfall was due to a expiration of the W62 Nuclear Explosive Safety Study and other facility related issues.

Weapon alterations and modifications are crucial to upgrade the stockpile to meet higher safety standards, replace faulty components, meet changed military requirements, or extend the life of the weapon. During Fiscal Year 1998, the Department had eight weapon alterations and modification ongoing (either research and development activities or refurbishment). The alterations were for the B61 (three), W87 (two), B83 (two), and the W76. The modification was for the B83. All of these activities were performed on schedule. The one modification this year was completed on schedule. DOE plans to complete the remaining required tests next fiscal year. Even with this shortfall, the DOE was able to give the DoD a reliability assessment.

Status: Successful

NS 1-4 DEVELOPING A REPLACEMENT SOURCE OF TRITIUM

Status: Successful

Description: Provide a reliable source of tritium as required for the nuclear weapons stockpile by FY 2005 or FY 2007 depending on the production option selected.

Success will be measured by:

Success will be measured in FY 1998 by completing the analysis to support the selection by December 1998, of a new production source for tritium.

Analysis: Tritium, is a radioactive isotope of hydrogen essential to the proper function of all U.S. nuclear weapons. Tritium decays at about 5 percent per year and must therefore be replaced in weapons periodically. No new tritium has been produced by the U.S. since 1988. Tritium is recycled from dismantled weapons to meet stockpile requirements. A reliable source of tritium production for the stockpile should be available by fiscal year 2005 or fiscal year 2007 depending on the technology selected.

In late 1995 DOE announced it would pursue a dual track approach to examine and demonstrate the two most promising supply alternatives, the purchase of an existing or partially complete commercial light water reactor (CLWR) or purchase of irradiation services therefrom or the design and construction of an accelerator for the production of tritium (APT).

In January, 1998, the Tritium Supply Program completed the analysis of the primary tritium source options necessary to support a possible 2nd Qtr. FY 1998 technology decision by the Secretary. A

decision, however, was not made at that time. Both projects have continued development, demonstration, and design activities through FY 1998 and the analysis is expected to be updated for a decision expected by the end of December 1998.

CLWR activities so far this fiscal year include the following: In October 1997, thirty two tritium-producing rods were placed in the Tennessee Valley Authority's (TVA) Watts Bar reactor for an irradiation demonstration. Two draft environmental impact statements were completed and issued for public comment: Draft Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor and Draft Environmental Impact Statement for Construction and Operation of a Tritium Extraction Facility at the Savannah River Site. Preliminary design of the Tritium Extraction Facility, a FY 1998 milestone, has been completed and an independent, parametric cost estimate is being conducted. As required by Congress, an interagency review of nonproliferation policy issues has been completed. A technical report has been prepared and submitted to the Nuclear Regulatory Commission. DOE is in receipt of a proposal from the TVA for the Department to provide funds for completion of TVA's Bellefonte Unit 1 reactor in exchange for long-term irradiation services. An interagency agreement for irradiation services without completion of Bellefonte may also be a possibility. Concluding an agreement with TVA, a FY 1998 milestone, has not yet been completed, pending the Secretary's selection decision.

Accelerator Production of Tritium (APT) activities this fiscal year include the following: An engineering development and demonstration program has successfully demonstrated key elements of a tritium production accelerator. Performance testing of a laser beam through the Chalk River Injector Test Stand radio-frequency quadrupole (RFQ) was successfully completed and exceeded requirements. Fabrication and assembly of the copper RFQ for the Low Energy Demonstration Accelerator was completed. Installation of the RFQ and preparations for tests of beam through the RFQ were nearly completed. Preliminary engineering design of the APT plant was initiated in October 1997. An APT Modular Design Study, optimizing plan configurations for START-I and START II stockpile requirements, was completed in May 1998. Safety presentations to independent reviewers and the DNFSB were conducted throughout the year. Issues raised by these reviewers have resulted in features being incorporated into the APT design to increase its safety. A draft Environmental Impact Statement to construct and operate the APT at the Savannah River Site was completed and approved, public hearings were held, and the final EIS was completed for review.

Status: Successful

NS 2-1 REPLACING UNDERGROUND TESTING WITH SCIENCE

Status: Fully Successful

Description: Develop the advanced simulation and modeling technologies necessary to confidently mitigate the loss of underground testing by FY 2004.

Success will be measured by:

Success will be measured in FY 1998 by meeting established schedules for the development and installation of a 3- trillion operations per second computer system.

Analysis: The Accelerated Strategic Computing Initiative (ASCI) is a time-critical, essential element of the Department of Energy's Stockpile Stewardship Program. ASCI will enable DOE to develop the advanced simulation and modeling technologies necessary to shift from the past stockpile management approach based on new weapon development and nuclear testing to a science-based approach based on maintenance of the existing stockpile through advanced simulation and fundamental experiments. Specifically, ASCI will create and provide to all stewardship activities the leading-edge weapon simulation capabilities that are essential for maintaining the safety, reliability, and performance of the nation's nuclear stockpile under the current nuclear test moratorium and to meet the challenge set forth by the Comprehensive Test Ban Treaty.

Currently, ASCI is meeting all established schedules for the development and installation of a 3-trillion operations per second computer system. The initial delivery of a computer system was received in FY 1997, and the technology refresh was installed in the first half of FY 1998. Code development teams, including weapons designers, at the national weapons laboratories are using the system performing at a level of between 400-900 billion operations per second and running weapons simulations that are larger and more complex than was possible on previous machines. These simulations include higher resolution, improved physics models, and more robust computational math. At the end of September 1998, three months ahead of schedule, IBM benchmarked the 3-terops computer system at a sustained 1-teraops calculation.

Status: Fully Successful

NS 2-2 DEVELOPING NEW EXPERIMENTAL CAPABILITIES FOR UNDERSTANDING WEAPONS SCIENCE

Status: Fully Successful

Description: Develop new nuclear weapons physics experimental test capabilities.

Success will be measured by:

Success will be measured in FY 1998 by beginning the physical construction according to schedules in the Project Execution Plan for the National Ignition Facility (NIF).

Analysis: The NIF Project is essentially on schedule and on cost, and all aspects of the Project are making satisfactory progress. All of the Project's firm fixed price building contracts have been awarded. In June, major concrete pours for the Target Building and Switchyard floors were completed essentially on schedule. Construction of the Laser Building and Central Plant, which are on the critical path for Conventional Facilities, is currently delayed 2-4 weeks, but the Project completion date is being held. The critical task for the remainder of this year is to get the roofing and siding completed by the start of the next rainy season. Design and procurement of special equipment and materials are the most challenging aspects of the NIF Project. Design reviews continue to be successfully completed and production of engineering drawings continues, although at a slower rate than planned. The beam transport system procurement was awarded in June, and the target chamber contract is on schedule. Establishment of needed manufacturing

capacity at optics vendors is proceeding well as they prepare for pilot production beginning in early FY 1999. More information on the NIF project can be obtained at http://lasers.llnl.gov/lasers/nif.html

Status: Fully Successful

NS 2-3 CONDUCTING EXPERIMENTS TO ADVANCE OUR UNDERSTANDING OF WEAPONS BEHAVIOR

Status: Partially Successful

Description: Advance our understanding of the fundamental characteristics of weapons behavior through systems engineering and advanced experiments and modeling to support future assessments of weapons safety, reliability, and performance.

Success will be measured by:

Success will be measured in FY 1998 by conducting three to four subcritical experiments to provide information about the behavior of nuclear materials during the implosion phase of a nuclear weapon.

Analysis: Subcritical experiments are designed to provide an improved understanding of certain dynamic material properties of plutonium, the fissile material in most primaries, and are consider essential for assessing nuclear warhead performance, reliability, and safety in the absence of nuclear testing. These experiments also make a significant contribution to maintaining nuclear test readiness, required by Safeguard C of the Comprehensive Test Ban Treaty and Presidential Decision Directive.

On March 25, 1998, we conducted the first subcritical experiment of FY 1998, Stagecoach, a Los Alamos National Laboratory experiment. On September 26, 1998, Bagpipe, a Lawrence Livermore National Laboratory subcritical experiment, was successfully executed. Extensive preparatory work has been completed for Cimarron and Clarinet, the third and fourth subcritical experiments planned for FY 1998. Planned execution for Cimarron is November, 1998, and Clarinet is planned to follow one or two months thereafter. The Stagecoach subcritical experiment was used to obtain additional data on the equation of state of high explosively shocked plutonium materials at high pressures and to develop diagnostic instrumentation for future experiments. In addition to providing information that will be used on future subcritical experiments, Bagpipe was also used to further understanding of the effects on plutonium of aging, the use of different coating materials, and the effects of different manufacturing methods. Data from subcritical experiments will be used to develop the science-based stewardship computer models.

Status: Partially Successful

NS 3-1 DOWNSIZING AND MODERNIZING THE NATIONAL SECURITY ENTERPRISE

Status: Partially Successful

Description: Provide an appropriately-sized, cost-effective, safe, secure, and environmentally sound national security enterprise. Ensure that sufficient scientific and technical personnel are available to meet DOE's long-term national security requirements.

Success will be measured by:

Ensuring that all facilities required for successful achievement of the Stockpile Stewardship and Management Plan remain operational, and the established schedules for downsizing and modernization of the production facilities are met (DP)

Analysis: Two key activities are underway to provide operational production facilities for the successful implementation of the Stockpile Stewardship Plan. These two activities are the reestablishment of a Pit Production Program at the Los Alamos National Laboratory in New Mexico and resumption of Enriched Uranium Operations (EUO) at the Y-12 Plant near Oak Ridge, Tennessee.

During FY 1997 shipping/receiving, assembly/disassembly, depleted uranium operations, and evaluation of canned subassemblies operations were all restored. Phase A1 of the enriched uranium operations resumption process (resuming casting, rolling and forming, and machining operations) restarted in June 1998. Phase A2 (materials control and accountability functions) has been delayed and rescheduled to November 1998. The final phase (phase B) of resumption provides chemical processing capabilities, is scheduled for completion in calendar year 1999.

The Pit Production Program successfully demonstrated on schedule the first major step in its plan to reestablish a pit production capability. In February 1998 the first early development unit pit was successfully produced. While not meeting the full certification requirements to enter the stockpile this pit did successfully demonstrate the first series of capabilities needed to produce a fully certified pit.

The downsizing and modernization of production facilities are planned under the Stockpile Management Restructuring Initiative. This includes the tritium facilities at the Savannah River Site near Aiken, South Carolina; uranium machining, recycling and storage facilities at the Y-12 Plant at the Oak Ridge Reservation, Oak Ridge, Tennessee; assembly/disassembly and high explosive fabrication facilities at the Pantex Plant near Amarillo, Texas; and non-nuclear production facilities for electronic, electro-optical devices, plastic and machined parts at the Kansas City Plant in Kansas City, Missouri. Construction funds for the downsizing at Savannah River and Y-12 were received in FY 1998 and construction funds for Pantex and Kansas City have been requested in the FY 1999 Budget.

Title I design for the project at Savannah River, scheduled to commence the second quarter of this fiscal year was delayed to the third quarter. Physical construction started in the third quarter on schedule. Due to rescoping, the start of the Title I design of the Y-12 project was delayed from the first quarter of this fiscal year to the fourth quarter. For the projects at Pantex and Kansas City critical decision two (approval of baselines) was not approved in the fourth quarter as scheduled

Status: Partially Successful

NS 3-5 MAINTAINING READINESS FOR NUCLEAR EMERGENCIES

Status: Fully Successful

Description: Maintain nuclear test readiness and enhance emergency management capabilities to address any nuclear weapons, radiological, or other emergency in the United States or abroad.

Success will be measured by:

Ensuring that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT through a combined experimental and test readiness program.

Analysis: Maintaining the capability to resume nuclear testing requires DOE to maintain (1) test facilities and equipment at the Nevada Test Site (NTS) and (2) nuclear testing skills of personnel at both the NTS and the nuclear weapons laboratories.

Experiments requiring large quantities of high explosives or special nuclear materials driven by small amounts of high explosives, the latter referred to as subcritical experiments, are conducted at the NTS. These experiments and specially designed test readiness exercises maintain NTS personnel test readiness skills including containment, security, assembly, storage and transportation, insertion and emplacement, timing and control, arming and firing, diagnostics, test control center activities, and postshot drilling.

Two subcritical experiments, Stagecoach and Bagpipe, and 29 high-explosive experiments have been conducted at the NTS in FY 1998. In September, 1998, we conducted VENTEX98, a table-top exercise that simulated a mass venting of an underground nuclear test at the Nevada Test Site for the purpose of exercising the emergency response systems that could be needed during a nuclear test.

The NTS also has an ongoing archiving program capturing on videotape the knowledge and testing experience of departing personnel as well as data, photos, drawings, procedures, nuclear explosive safety studies, containment evaluation plans, lesson learned, and other information.

In FY 1998, almost 84 hours of video taping of subject matter experts discussing 11 functional areas was completed; over 32,000 pages of documents were scanned and indexed into the archiving database; and encyclopedic-style CD-ROMs covering 5 functional areas were produced.

Hundreds of stockpile stewardship experiments have been conducted this fiscal year at nuclear weapons laboratory facilities such as the Flash X-Ray, Pulsed High-Energy Radiographic Machine Emitting X-Rays, Pegasus, Los Alamos Neutron Science Center, Nova Laser, High Explosive Applications Facility and PBFA Z which exercise many nuclear testing related skills and technologies, including nuclear design, experiment integration, nuclear chemistry, and weapons engineering.

Status: Fully Successful

Maintaining robust emergency response assets in accordance with Presidential Decision Directive 39, The Atomic Energy Act of 1954 and Executive Order 12656 to ensure Departmental response to any nuclear weapons or radiological emergency in the United States or abroad.

Analysis: The Department's Emergency Response program provides a national capability to respond to any radiological emergency or nuclear accident within the United States and abroad. The all volunteer force that makes up the cadre of deployment forces is mostly from the nuclear weapons laboratories. The seven major capabilities/assets maintained are the Aerial Measuring System (AMS), the Accident Response Group (ARG), the Atmosphere Release Advisory Capability (ARAC), the Federal Radiological Monitoring & Assessment Center (FRMAC), the Radiological Assistance Program (RAP), the Nuclear Emergency Search Team (NEST) and the Radiation Emergency Assistance Center & Training Site

(REAC/TS). These capabilities are maintained primarily through participation in national, state and local operations, exercises, and training.

The Department's emergency response program performed at a Fully Successful level for FY 1998. Highlights of these activities for the fiscal year are as follows: During FY 1998, DOE radiological emergency response assets participated in 32 U.S. and overseas exercises and 17 real-world events. Also, REAC/TS responded to 67(60 U.S.- 7 Foreign) calls for medical assistance for 224 individuals and provided radiation accident management training to 399 health professionals. During June 1998, emergency response assets participated in an interagency exercise ELLIPSE ALPHA in Virginia Beach, Virginia. The objective of the exercise was to evaluate the federal capabilities of responding to a domestic radiological Weapon of Mass Destruction. In September 1998, Departmental emergency assets also participated in a major overseas exercise ELLIPSE BRAVO. The objective of the exercise was to evaluate and validate the U.S. federal response to a biological Weapon of Mass Destruction in an international environment. On October 15, 1997, emergency response support was provided to the National Aeronautics and Space Administration for the launch of the Cassini Space Mission to Saturn. The Department participated with multiple agencies to identify support requirements and develop ground operations and emergency response plans and procedures in the event of a launch accident and the release of radioactive material. On board generators contained 32.8 kilograms of plutonium dioxide. Over 100 personnel and equipment from RAP, ARAC, REAC/TS, and FRMAC, capable of providing onsite and offsite radiological support, participated in the launch. A joint U.S./U.K. nuclear weapon accident command post exercise DIAGONAL GLANCE was conducted in the United Kingdom during the period September 15-18, 1998. The scenario involved a U.S. Air Force aircraft carrying nuclear weapons crashing on U.K. soil. The primary objective of DIAGONAL GLANCE was to evaluate international, national, and local government agreements, policies, procedures, and interfaces as they apply to a U.S. nuclear weapon accident occurring on U.K. soil. Between April 2-8, 1998, RAP teams were deployed to provide assistance to the State of Connecticut and the Environmental Protection Agency (EPA) in conducting surveys for radioactive contamination in buildings previously used in the clock manufacturing and the radium dial painting industry. Ten buildings in four different cities were surveyed. Contamination was found in four of the five occupied buildings. As lead Federal Agency, the EPA recommended follow-up resolutions and protective actions. With respect to Domestic Preparedness Training in support of the Nunn, Lugar, Domenici legislation, RAP and REAC/TS elements participated in 29 city visits and training activities. In April 1998, the Department of State requested DOE radiological advisory assistance to the United Arab Emirates to validate either the presence or absence of radiological contamination threat at the crash site of an airliner. The Departmental assets performed an assessment of the threat of "Red Mercury" being aboard the aircraft which had crashed in the desert on December 16, 1997, killing 77 individuals. No evidence of radiological contamination was detected.

Status: Fully Successful

NS 4-1 REDUCING THE WEAPONS STOCKPILE

Status: Fully Successful

Description: Dismantle nuclear warheads that have been removed from the U.S. nuclear weapons stockpile in a safe and secure manner.

Success will be measured by:

Success will be measured in FY 1998 by adhering to schedules for the safe and secure dismantlement of approximately 1,000 nuclear warheads that have been removed from the U.S. nuclear weapons stockpile.

Analysis: In fiscal year 1998, 1062 U.S. nuclear warheads were dismantled versus a fiscal year goal of 1004. The majority of dismantlements were W69 Short-Range Attack Missile warheads, in addition to some W79 Artillery-Fired Atomic Projectile warheads and surveillance units.

Status: Fully Successful

Defense Programs FY 1999 Performance Agreement

(Budget Authority Dollars in Millions)

FY 1999 Performance Measure	Budget Reference [a]	FY 1999 Estimate
Meeting all annual weapons alteration and modification schedules developed jointly by DOE and DoD.	1 1	834
Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapon stockpile.	1.3.a 1 3.b	373
Continue development of the dual-path options and select, by December 1998, a primary tritium production technology	1.4.a/b	167
Demonstrate a 3-trillion operations per second computer system	2 1.b	107
Continue construction of the National Ignition Facility (NIF) according to its Project execution Plan schedules.	2.2 a	378
Conducting two to three subcritical experiments to provide information about the behavior of nuclear materials during the implosion phase of a nuclear weapon	2.3 a	87
Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan remain operational	3.1 a	406
Meet the established schedules for downsizing and modernizing our production facilities.	3.1.b	68
Ensure that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT.	3.5.a	124
Maintain robust emergency response assets in accordance with Presidential Decision Directive 39, the Atomic Energy Act and Executive Order 12656 and Federal Emergency Plans.	3.5.b/c	76
Adhering to schedules for the safe and secure dismantlement of approximately 275 nuclear warheads that have been removed from the U S nuclear weapon stockpile.	4.1.a	173

[a] FY 1999 Congressional Budget Request, Listing of Performance Measures, Objective N, Strategy N, Performance Measure a-e

Defense Programs FY 2000 Performance Plan

(dollars in millions)

FY 2000 Performance Measure	Budget Reference [a]	FY 2000 Estimate
Meeting all annual weapons alteration and modification schedules developed jointly by DOE and DoD.	1 1	898
Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapon stockpile.	1.3.a	363
Undertake an independent assessment of the Stockpile Stewardship Program and its implementation throughout the DP national security enterprise	1.3.c	2
Begin implementation of the selected technology and backup to provide a reliable source of tritium.	1.4.a/b	170
Demonstrate a computer code capable of performing a three dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an ASCI computer system	2.1 c	88
Continue construction of the National Ignition Facility (NIF) according to its Project execution Plan schedules.	2 2.a	346
Conduct two subcritical experiments to provide valuable scientific information about the behavior of nuclear materials dunng the implosion phase of a nuclear weapon	2.3.a	73
Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan remain operational.	3.1.a	287
Meet the established schedules for downsizing and modernizing our production facilities.	3 1.b	61
Ensure that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT.	3.5.a	143
Maintaining robust emergency response assets in accordance with Presidential Decision Directive 39, the Atomic Energy Act and Executive Order 12656, and Federal Emergency Plans.	3.5.b/c	77
Adhere to schedules for the safe and secure dismantlement of approximately 375 weapons that have been removed from the U.S. nuclear weapon stockpile.	4.1.a	153

[a] FY 2000 Congressional Budget; Listing of performance measures, Objective N, Strategy N, Performance measure a-e.

Stockpile Stewardship

Program Mission

The Stockpile Stewardship Program is responsible for providing the capabilities to maintain high confidence in the nuclear stockpile. The maintenance of the research and development (R&D) infrastructure, which includes not only the physical complex of the three weapons laboratories and the Nevada Test Site, but also the scientists and engineers and the basic and applied research base on which the vitality and technical capabilities of the laboratories and the Nevada Test Site rest, is essential to success. The success of the Stockpile Stewardship Program is dependent upon Defense Programs' ability to maintain the level of scientific based capability needed to provide the ongoing technology and science resources required to insure that any Department question can be addressed by the best scientists and engineers using the most advanced sciences and technologies. This capability is of primary importance for the nuclear weapons stockpile responsibilities of the Department, but also supports the needs of other users of the laboratories and the Nevada Test Site by maintaining basic capabilities.

Weapons Stockpile Stewardship provides upgraded or new experimental, computational, and simulation tools needed to address issues of maintaining confidence in the safety, security, and reliability of the nuclear stockpile without underground nuclear testing. The cornerstone of the experimental capabilities provided by the Stockpile Stewardship Program is the National Ignition Facility (NIF) which is currently under construction at the Lawrence Livermore National Laboratory. NIF will provide the means to experimentally study primary boosting, assess secondary performance and weapons effects, and improve and validate new physics models and codes. The Dual Axis Radiographic Hydrodynamic Test (DARHT) facility, currently under construction at the Los Alamos National Laboratory will be the Nation's most advanced hydrodynamic experimental facility; DARHT experiments are essential for validating the implosion performance of primaries. Computational modeling and predictive simulation are integral to every activity in the Stockpile Stewardship and Management Program. Advanced computational and simulation capabilities being developed under the Accelerated Strategic Computing Initiative (ASCI) will be incorporated into ongoing stockpile computational activities. The program also includes research and development to provide the technology required for stockpile management. Key to the success of this science-based program is ensuring that highly qualified people are available for national security programs. At the most fundamental level, the Stockpile Stewardship Program relies on the judgment and skills of experienced scientists and engineers, supported by essential experimental and computational resources, and the preservation of their knowledge base.

Program Goals

- Provide high confidence in the safety, security, reliability and performance of the enduring U.S. nuclear stockpile, without underground nuclear testing, to ensure the effectiveness of the U.S. nuclear deterrent while simultaneously supporting U.S. arms control and nonproliferation objectives.
- Provide the ability to resume U.S. underground nuclear testing and reconstitute nuclear weapons production capacities, consistent with Presidential directives and the Nuclear Posture Review.

Program Objectives

There are four national security objectives in the DOE Strategic Plan upon which this program and budget are based:

- Maintain confidence in the safety, reliability, and performance of the nuclear weapons stockpile without underground nuclear testing.
- Replace nuclear testing with a science-based Stockpile Stewardship Program.
- Ensure the vitality of DOE's national security enterprise.
- Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.

Strategies

Weapons Stockpile Stewardship supports the following strategies:

- Extend the life of U. S. nuclear weapons by continuing the Stockpile Life Extension Program and Stockpile Maintenance activities.
- Improve detection and prediction capabilities for assessing nuclear weapon component performance and the effects of aging.
- Continually evaluate the safety, reliability, and performance of the nuclear weapons stockpile.
- Develop the advanced simulation and modeling technologies and computational tools necessary to confidently mitigate the loss of underground nuclear testing.
- Develop new nuclear weapons physics experimental test capabilities.
- Advance our understanding of the fundamental characteristics of weapons behavior through weapon systems engineering and advanced experiments to support future assessments of weapons safety, reliability, and performance.
- Provide an appropriately-sized, cost-effective, safe, secure, and environmentally sound national security enterprise.
- Ensure that sufficient scientific and technical personnel are available to meet DOE's long-term national security requirements.
- Ensure and enhance protection of nuclear materials, sensitive information, and facilities.
- Maintain test readiness and maintain and enhance emergency response and management capabilities to address any nuclear weapons, radiological or other emergency in the U.S. or abroad.
- Dismantle nuclear warheads that have been removed from the U.S. nuclear weapons stockpile in a safe and secure manner.

Performance Measures

For **FY 2000**, the Stockpile Stewardship Program will support the following performance measures:

- Meet all annual weapon alteration, modification, and surveillance schedules developed jointly by DOE and DoD.
- Conduct studies and development work required to support weapons systems and components for the future stockpile.

- Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapons stockpile.
- Revalidate enduring stockpile systems to meet established military characteristics.
- Provide the computer platforms sized to support the stewardship objective of full physics, high fidelity simulations of nuclear weapons performance.
- Deliver three-dimensional high fidelity weapons performance codes by 2004.
- Demonstrate a computer code capable of performing a three-dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an Accelerated Strategic Computing Initiative (ASCI) computer system.
- Develop and implement visualization, networking and data management systems to efficiently support utilization of ASCI codes and computers across the weapons complex.
- Continue construction of the National Ignition Facility (NIF) according to its Project Execution Plan schedules.
- Meet all cost and schedule goals for construction of the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility consistent with an FY 2002 completion.
- Meet all cost and schedule goals for construction of the Contained Firing Facility at LLNL consistent with a fourth quarter FY 2001 completion.
- Meet all cost and schedule goals for construction of the Atlas facility at LANL consistent with a first quarter FY 2001 completion.
- Obtain and assess information required to decide whether to construct 1) an advanced hydrotest facility and/or 2) an advanced pulsed power facility.
- Conduct two subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon.
- Conduct experimental and theoretical research necessary to maintain or advance research, development, and engineering capabilities in nuclear materials science and weapons design.
- Conduct high energy density research on inertial confinement fusion facilities necessary to enhance understanding of areas of physics relevant to a better predictive assessment of nuclear weapons performance.
- Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan are operational.
- Ensure that the capability to resume underground nuclear testing is maintained, in accordance with Presidential Decision Directive and Safeguard C of the Comprehensive Test Ban Treaty (CTBT).
- Establish strategic alliances and collaborations among the weapons laboratories, industries, and universities to enable effective use of scientific and technical personnel throughout the R&D community.

For **FY 1999**, the Stockpile Stewardship Program, as funded by the FY 1999 appropriation, will support the following significant overall performance measures:

- Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapons stockpile. (Secretary of Energy Bill Richardson certified to the President that the nuclear stockpile is safe, secure, and reliable on December 22, 1998.)
- Meet all DoD annual weapons alteration, modification, and surveillance schedules.
- Continue revalidation of the military characteristics of the W76 warhead, and begin revalidation of a second weapon type.
- Accelerate the ongoing development of critical, full-physics, three-dimensional weapons simulation codes; specifically, perform sustained weapons simulations at 1 trillion operations per second.
- Demonstrate operation of a 10 trillion operations per second computer system.
- Deliver a computer code capable of performing a three-dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an ASCI computer system. Compare computed results with existing nuclear test data.
- Meet all cost and schedule goals for construction of NIF and related technology development, including completion of the Optics Assembly Building, initiation of Special Equipment installation, and completion of the Target Bay Area for Target Chamber installation.
- Begin operations of the first accelerator of DARHT and deliver accelerator cells for prototype testing with the beam for the second accelerator.
- Make the decision within the 5-year period whether to construct an advanced hydrotest facility and/or an advanced pulsed power facility.
- Conduct two to three subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon.
- Establish strategic alliances and collaborations among the weapons laboratories, industries, and universities to enable effective use of scientific and technical personnel throughout the R&D community.
- Maintain the capability to resume underground testing, in accordance with Presidential direction.

Significant Accomplishments and Program Shifts

During **FY 1998**, implementation of the Stockpile Stewardship Program, initiated in FY 1994, continued in accordance with the Stockpile Stewardship and Management Plan and resulted in the following accomplishments:

- Successfully completed certification of the safety and reliability of the U.S. nuclear weapons stockpile according to DOE/DoD procedures.
- President Clinton announced and endorsed ASCI's Pathforward initiative contract awards at a LANL press conference on February 3, 1998. Awardees of the $50 million 4-year contracts aspire to achieve a 30Tf supercomputer performance by the year 2001.

- DOE announced on February 12, 1998, selection of IBM for the ASCI Option White (10Tf) supercomputer to be located at LLNL.
- Vice President Gore and Energy Secretary Bill Richardson announced on October 28, 1998, the world's fastest computer at LLNL. The ASCI Blue Pacific - SST IBM machine, which contains 2.6 trillion bytes of memory, and will perform 3.9 trillion operations per second.
- Measured a fundamental property of hydrogen (equation of state) in the Nova laser at weapon-relevant pressures providing unexpected results that change our understanding of weapon performance and the state of hydrogen within the planet Jupiter. This work was awarded the American Physical Society's prize for the Outstanding Plasma Physics Accomplishment for 1998.
- Completed flight tests and laboratory tests which support stockpile surveillance activities, including flight tests to support the final certification of the B61-11.
- Completed modeling of applicable past nuclear tests and hydro tests for certification rationale to support the SLBM Warhead Protection Program.
- Continued development activities for, or refurbishment of, eight weapons alterations and/or modifications, including B61, W87, B83, and W76 alts, and the B83 mod.
- Successfully conducted the third and fourth subcritical experiments, "Stagecoach" and "Bagpipe," which provided data to improve the accuracy of computer simulations of nuclear weapons as part of the science-based Stockpile Stewardship Program, and were used to develop and refine diagnostics for the more complex subcritical experiments of the future.
- Maintained the capability to resume underground nuclear testing in accordance with the Presidential Decision Directive and Safeguard C of the CTBT through a combined experimental and test readiness program that included 29 high-explosive experiments at the Nevada Test Site and hundreds of stockpile stewardship experiments conducted at various facilities which exercise many nuclear testing related skills and technologies, including nuclear design, experiment integrations, nuclear chemistry, and weapons engineering. Conducted a table-top exercise that simulated a mass venting of an underground nuclear test at the NTS, exercising the emergency response systems that could be needed during a nuclear test. Continued an ongoing archiving program designed to preserve the knowledge and testing experience of departing personnel as well as data, photos, drawings, procedures, nuclear explosive safety studies, containment evaluation plans, lessons learned, and other information.
- Developed and used proton radiography to examine high explosive detonation issues related to typical weapons in the U.S. stockpile which allows designers to assess high explosive performance over a large temperature range and to develop computational models used for stockpile assessment and certification.
- Using neutron resonance spectroscopy, obtained the first simultaneous measurements of the internal temperature and average velocity of atoms in a shocked metal which will underpin detailed models of the hydrodynamics of weapon materials.
- Created a new encapsulant for nuclear weapon components with much higher resistance to high voltage breakdown which will improve the reliability of miniature high voltage firing sets.

- Developed ion-implantation process which has doubled the strength of electroformed nickel alloys for nuclear weapon miniature electromechanical devices such as strong-link switches and gyroscopes.
- Completed facility construction of the first arm of DARHT at the Los Alamos National Laboratory and began the preliminary design of the second axis accelerator for DARHT.
- Began the physical construction of NIF on schedule and maintained schedule throughout the year despite the impacts of El Niño rains.

Program Shifts

In FY 2000, the first steps will be taken to integrate the advanced computational and simulation models, methodologies, and materials models developed and matured within the Accelerated Strategic Computing Initiative with various relevant and complementary components of ongoing Core Stewardship activities. These integrated activities are key elements of the model and simulation-based capabilities needed to maintain the Nation's nuclear weapon stockpile. Advancements in systems modeling will be incorporated into the ongoing technical reviews of stockpile weapons conducted in support of the annual certification process. Materials models and databases will be utilized to address weapons aging and reliability issues and to support the reliability and surety of remanufactured components. Verified and validated primary and secondary codes will be used to support the surveillance, assessment and refurbishment of the weapons systems in the nuclear weapons stockpile. **Integration of achievements from Accelerated Strategic Computing Initiative (ASCI) with the ongoing Core Stewardship program** is essential to provide high confidence in the safety, security, reliability and performance of the enduring U.S. nuclear stockpile, without underground nuclear testing.

The Stockpile Stewardship Program plans to invest in an **infrastructure construction initiative** at the three laboratories and the Nevada Test Site. Over a 5 - 10 year period, the goal is to invest approximately $100 million per year to maintain and refurbish aging infrastructure systems and facilities. The funding planned for the initiative will support ongoing and new infrastructure construction projects, but does not include the funding for programmatic construction projects.

The funding responsibility for the **Los Alamos County School District** subsidy and the **Northern New Mexico Education Enrichment Foundation** have been transferred to the Education program from the Weapons Program Direction budget. Funding for the **National Atomic Museum**, to be located at the International Balloon Park Museum in northern Albuquerque, New Mexico is also included in the Education program.

Defense Programs is studying the replacement of the current Administration Building complex (SM-43) at Los Alamos National Laboratory. This complex serves both administrative and technical divisions, including weapon assessment and certification groups. The complex is 45 years old and increasingly difficult and costly to maintain. All building systems have exceeded their design life. The Department is facing expensive upgrades to the electrical and fire protection systems, as well as major seismic upgrades.

Site-Wide Environmental Documentation

Defense Programs oversees and coordinates site-wide environmental documentation activities at the three weapons laboratories and the Nevada Test Site, as the Department's landlord, although funding is provided by all affected activities at each site. The Record of Decision on the Nevada Test Site site-wide environmental impact statement (SWEIS) was completed in December 1996. The Los Alamos National Laboratory SWEIS is expected to be completed by the end of the second quarter of FY 1999. The Sandia National Laboratories (New Mexico) SWEIS has begun, with a Notice of Intent completed in May of 1997. The draft SWEIS is

scheduled for distribution for comment in the second quarter of FY 1999, with completion of the SWEIS anticipated by the end of FY 2000. Defense Programs is also conducting a 5-year review or supplement analysis of the Lawrence Livermore National Laboratory SWEIS, originally completed in 1992; a determination on this supplement analysis is expected in the second quarter of FY 1999. The Stockpile Stewardship and Management programmatic environmental impact statement (PEIS), the basis of the FY 1997 Record of Decision for Defense Programs, supports major projects including NIF. Defense Programs is preparing a supplemental EIS for the National Ignition Facility to review the environmental impacts of additional information discovered since the Stockpile Stewardship and Management PEIS was completed.

Management and funding responsibility for several production related facilities at LANL, including the Plutonium Facility (Technical Area 55), the Chemistry and Materials Research Laboratory, and the Los Alamos Criticality Experiments Facility, was transferred to the Weapons Stockpile Management decision unit in FY 1998.

Conceptual Design Reports and Post-Conceptual Design Engineering

During the budget request period, FY 1999-FY 2001, Defense Programs may choose to begin conceptual design activities for an advanced hydrotest facility and an advanced pulsed power facility. It is estimated that each of these conceptual design reports will likely cost in excess of $3 million.

Budget Structure

The Weapons Stockpile Stewardship budget request is organized in the following manner:

- **Core Stockpile Stewardship**: This program supports the specific activities required for science-based Stockpile Stewardship through the maintenance of the physical and intellectual infrastructure at Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Sandia National Laboratories and the Nevada Test Site. Major program elements include Programs and Initiatives, Core Research and Advanced Technology, and Testing Capabilities and Readiness. The budget structure for Core Stockpile Stewardship is more "functional" than "programmatic." Because there is such a large research and development aspect to Stockpile Stewardship, in many cases, the basic capabilities that we must maintain across the laboratories and plants serve many programmatic objectives. While they are not "functional" in the same sense as the Department's Functional Cost Reporting structure which focuses on indirect activities, they are inputs, rather than outputs, for the laboratories.
- **Inertial Confinement Fusion**: The Inertial Confinement Fusion program is a research and advanced technology development effort directly supporting the Department's national security mission in Stockpile Stewardship. The National Ignition Facility (96-D-111), a 192-beam neodymium glass laser facility intended to achieve controlled thermonuclear fusion in the laboratory, is under construction at LLNL. When completed, the NIF will be a cornerstone of the Stockpile Stewardship program, and represents a major initiative for the Department.
- **Technology Partnerships and Education**: The Technology Partnerships and Education programs directly share the expertise and scientific development in the laboratories with the private sector and obtain skills and knowledge from the private sector for the enhancement of laboratory capabilities. The Technology Partnerships program strengthens the science and technology base through participation in cooperative, dual-benefit partnerships with private industry. Education initiatives support science education activities and enhance continuing technical capabilities in support of the program's mission, exercising the unique capabilities of the Department of Energy with emphasis on graduate and post-graduate activities.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Stockpile Stewardship					
Core Stockpile Stewardship					
Operations & Maintenance	1,281,104	1,482,632	-29,330	1,453,302	1,635,355
Construction	98,810	103,443	3,683	107,126	133,145
Total, Core Stockpile Stewardship	1,379,914	1,586,075	-25,647	1,560,428	1,768,500
Inertial Confinement Fusion					
Operations & Maintenance .	215,654	223,800	-4,618	219,182	217,600
Construction	197,800	284,200	0	284,200	248,100
Total, Inertial Confinement Fusion	413,454	508,000	-4,618	503,382	465,700
Technology Partnerships & Education					
Technology Partnerships . .	55,901	45,000	-1,928	43,072	22,200
Education	8,944	9,000	0	9,000	29,800
Total, Technology Partnerships & Education	64,845	54,000	-1,928	52,072	52,000
Subtotal, Stockpile Stewardship	1,858,213	2,148,075	-32,193	2,115,882	2,286,200
Use of prior year balances	-454[a]	-39,552[b]	32,193[c,d]	-7,359	0
Total, Stockpile Stewardship	1,857,759	2,108,523	0	2,108,523	2,286,200

Public Law Authorization:

Public Law 105-85, National Defense Authorization Act for FY 1998.

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[a] Reflects Stockpile Stewardship allocation of appropriated use of prior year balances: Core Stewardship $ -359,000; ICF $ -52,000; and Technology Partnerships $ -43,000.

[b] Reflects Stockpile Stewardship allocation of appropriated use of prior year balances: $ -39,552,000.

[c] Reflects Stockpile Stewardship allocation of appropriated use of prior year balances, taken as reductions to new budget authority: Core Stewardship $ -33,006,000; ICF $ -4,618,000; and Technology Partnerships $-1,928,000, and reapplication of available prior year balances to cover FY 1999 program activities: Core Stewardship $ +3,676,000.

[d] Reflects reprogramming of $3,683,000 (98-R-4), approved November 1998.

Discussion of Activities

The Stockpile Stewardship activities provide the physical and intellectual infrastructure at the weapons laboratories and the Nevada Test Site, and provides the scientific, engineering, and computational tools needed to address issues of maintaining confidence in the safety, reliability and performance of the nuclear weapons stockpile without underground nuclear testing. The Stockpile Stewardship decision unit consists of the Core Stockpile Stewardship, Inertial Confinement Fusion, Technology Partnerships, and the Education programs.

The FY 2000 budget for the Stockpile Stewardship program has been formulated to balance the need to develop and maintain essential scientific and technical capabilities over the long term with near-term workload requirements and schedules. This has required difficult, but appropriate, choices that have resulted in some reduction of opportunities to improve our understanding of the hydrodynamic behavior of primaries, develop physics and materials models, and take full advantage of the National Ignition Facility for weapons physics experiments.

Core Stockpile Stewardship

The FY 2000 request of $1,768.5 million for Core Stockpile Stewardship maintains a capable physical and intellectual infrastructure to support the enduring stockpile, including surveillance, evaluation, and preventive maintenance for the stockpile; provides and enhances the research, engineering and development capabilities, including advanced computing and experimental simulation and modeling, required to refurbish and recertify the enduring stockpile; maintains the capability to resume underground nuclear testing, if directed; and retains the ability to develop and support the manufacturing of replacement designs.

Direct Stockpile Activities includes studies and research to apply basic science to surveillance, assessment, and refurbishment requirements associated with the **nuclear weapons stockpile**, as defined by Department of Energy commitments to the DoD and Stockpile Management requirements. Included are Enhanced Fidelity Instrumentation, ACORN Implementation, the Submarine Launched Ballistic Missile Warhead Protection Program, and Stockpile Readiness/Safety Assessments. The Stockpile Life Extension Programs (SLEP) will provide Full Scale Engineering Development (FSED) and other required phase 6.2A and 6.3 activities for the W76 and W80, including support for the refurbishment First Production Unit (FPU) date of FY 2005 for the W76 and FY 2006 for the W80. Verified and validated primary and secondary code simulations and models will be used to support the surveillance, assessment and refurbishment of the weapons systems in the nuclear weapons stockpile.

Transitioning from 2-D to 3-D simulation codes will help to better predict many aspects of the aging stockpile.

Experimental Activities provides the ability to certify the enduring stockpile in the absence of nuclear testing, and improves our understanding of stockpile aging and the effects of reliability through experiments using high explosives and/or small quantities of special nuclear material. In FY 2000, two **subcritical experiments** will be conducted at the Nevada Test Site. Subcritical experiments are scientific experiments using chemical high explosives to generate high pressures which are applied to

nuclear materials. High speed measurement instruments are used to obtain valuable scientific data on the behavior of those nuclear materials under conditions similar to those during the implosion phase of a nuclear weapon. The configuration and quantities of explosives and nuclear materials are designed so that no nuclear explosion will take place. The data obtained from subcritical experiments will help benchmark complex computer simulations of nuclear weapons performance and will be used to help certify the safety and reliability of the Nation's nuclear weapons stockpile. With the moratorium on underground nuclear testing, scientists and engineers compare experimental data with data from prior underground nuclear tests in order to validate or modify computational codes.

Cimarron subcritical experiment conducted in Nevada on December 11, 1998.

Experiments will also be conducted at the **Los Alamos Neutron Science Center (LANSCE)** in advanced materials science, nuclear science and particle-beam accelerator technology in addition to weapons surveillance. The **Z Pulse Power Program**, which is funded through both the ICF and Core Stewardship programs, is supported at a constrained level sufficient to pursue only highest priority activities.

Also within Core Stockpile Stewardship, the **Accelerated Strategic Computing Initiative (ASCI)** is on track to attain 100 trillion operations per second (TeraOps) level by 2004, building upon the successes achieved with the demonstrated 1 TeraOp on the Option Red computer and the recently demonstrated performance of the Option Blue computer platforms at LLNL and LANL. The Option White computer is planned to perform at a peak level of 10 TeraOps in year 2000 through a sequence of technology updates. Also during FY 2000, ASCI will continue building "more complete physics" 3-D computer codes which, in conjunction with the experimental programs in core stewardship and ICF, are aimed at providing the required levels of fidelity in weapons simulations.

Stockpile Computing provides the traditional core computing capabilities in the weapons complex as well as implementation of the **Numerical Environment for Weapons Simulations**, (NEWS). Launched in FY 1999, NEWS will create localized data exploration super corridors to support large-scale data analysis and assimilation tasks for researchers and weapons assessment teams.

Construction is continued on two new experimental facilities: the **Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility** and the **Atlas pulsed power facility**, both at Los Alamos National Laboratory. DARHT's dual-axis, multi-time viewing capability will replace LANL's current diagnostic tool for hydrodynamic testing, the Pulsed High-Energy Radiographic Machine Emitting X-Rays, and provide crucial experimental data on many of the stockpile systems. Atlas will provide a pulsed power experimental capability to address secondary weapons physics questions in a high energy density environment.

Advanced hydrodynamic radiography development activities are supported, leading to a decision within the planning period whether to construct an advanced hydrodynamic radiography facility. Startup costs and a limited number of experiments on the Two Stage **Gas Gun** and the **Big Explosive Experimental Facility (BEEF)** at the Nevada Test Site are provided along with other experimentation and research radiation flow, cross sections, hydrodynamics, equation of state, etc, needed for advanced computer modeling and analyses, in lieu of underground nuclear testing.

Ongoing **Core Research and Advanced Technology** activities including physics; systems engineering; advanced manufacturing; chemistry and materials, high explosives, special nuclear materials, and tritium research will continue. Systems modeling and materials models and databases developed and matured in ASCI will be incorporated into these research areas.

Testing Capabilities and Readiness to resume underground nuclear testing within 2-3 years is maintained. Support is provided for the University of Nevada Cooperative Agreement which was initiated in FY 1998 to encourage and facilitate collaborative efforts between academic researchers at Nevada institutions of higher education and researchers at the national laboratories and other DOE contractors.

Funding is also included in Stockpile Stewardship's **infrastructure construction** account to initiate three new construction projects which will provide the unique floor space needed at the laboratories to house the state of the art computers as well as provide visualization and other capabilities to maximize the utility of the greatly enhanced computing capabilities by the weapon designers. The **Strategic Computing Complex** at LANL and the **Terascale Simulation Facility** at LLNL will provide clear unobstructed computer floor space with scalable power and cooling capabilities to house 100 TeraOps and beyond. The **Joint Computational Engineering Laboratory** at SNL will provide a state-of-the-art facility for research, development, and application of leading edge, high-end computational and communications technologies.

Inertial Confinement Fusion (ICF)

The request of $465.7 million for the ICF program supports a minimal indirect drive program and introduces some risk to the **National Ignition Facility (NIF)** research program. The request provides the required construction funding to maintain the project on schedule; however, the schedule for the ignition program on NIF will be at risk. Specifically, the funds will support NIF infrastructure buildup, operational training and initiation of laser area operations; NIF optics pilot production, NIF component validation; and,

The target bay floor slab with additional forms in place during the second week of November.

experiments and computational theory and modeling consistent with potentially delayed NIF ignition plan. The ICF program will provide the required capabilities for only the highest priority weapons program led experiments on Omega, and possibly, Nike. Funding for the NIF cryogenic handling system is not included in the request, deferring the initiation of this effort until FY 2001. The request supports the direct drive ignition program, based on the ignition plan, at Omega and the Nike facility at the Naval Research Laboratory. The Z program, which is funded through both the ICF and Core Stewardship programs, is supported at a level sufficient to pursue the highest priority activities. The request provides for the minimal level of target deliveries from General Atomics to the ICF laboratories, but does not include funding for any cryogenic research. Finally, support is provided for the grants program to independent investigators in high energy density physics directly related to stockpile stewardship.

Technology Partnerships

The FY 2000 request of $22.2 million supports, at a significantly reduced level, ongoing industrial partnerships focused on advanced manufacturing and the development of current and potential key suppliers of components, software, hardware, and equipment for the Weapons Stockpile Stewardship Program. In addition, funding is provided for the American Textile Partnership (AMTEX), the Advanced Computational Technology Initiative (ACTI), and the Small Business Program.

Education

The FY 2000 request of $29.8 million for the Education program provides funding for utilization of the unique resources of the Department of Energy national laboratories -- people, programs, and facilities -- to improve science and math education throughout the Nation. Enhancing the scientific education of our citizens will ensure a highly trained, diverse scientific workforce for the laboratories and will enhance our ability to conduct the Stockpile Stewardship mission. The projects, approved by Headquarters and conducted by the national laboratories, are grouped in six major categories: teacher/faculty enhancement, curriculum improvement, institutional improvement, student support, educational technology and public understanding of science. Each laboratory publishes an annual report on the projects and their accomplishments. Historically Black Colleges and Universities and other minority institutions receive approximately 15 percent of this funding.

Support for the Los Alamos County School District and the New Mexico Educational Enrichment Foundation, formerly funded under Weapons Program Direction, is included in the Stockpile Stewardship funding beginning this fiscal year. Funding is also requested for the National Atomic Museum to be built in Albuquerque, New Mexico.

Explanation of Funding Changes from FY 1999 to FY 2000

Stockpile Stewardship is requesting $2,286.2 million in FY 2000, an increase of $170.3 million, or 8 percent above the FY 1999 appropriation of $2,115.9 million. The funding increase, primarily in Core Stewardship, is needed to verify, validate, and integrate the simulation and modeling advances, developed and matured in ASCI, into the ongoing research and development program, which maintains the current nuclear weapon stockpile and supports the annual certification process. The integration of these simulation and modeling advances with the ongoing modeling efforts in materials science, hydrodynamics, and radiation flow is essential to achieving the weapons performance and safety code objectives required for stockpile assessment and certification without underground nuclear testing. The increase in funding also supports continued growth in the ASCI and Stockpile Computing programs; continuation of ongoing construction projects, initiation of three new infrastructure projects; the transfer

of funding to support the Los Alamos County School District and the Northern New Mexico Educational Enrichment Foundation from the Weapons Program Direction account; and the initiation of the National Atomic Museum at Albuquerque, New Mexico. These increases are partially offset by decreases to Technology Partnerships and NIF construction funding.

The budget request for the **Core Stockpile Stewardship** program is $1,768.5 million, an increase of $208.1 million, or 13 percent, over the FY 1999 adjusted appropriation. Additional information can be found in the Detailed Program Justification; however, significant funding changes include:

+ $ 37.6 million	Increase to **Direct Stockpile Activities** to support development activities to support refurbishment of the W76 Trident SLEP, and primary and secondary code verification and validation for stockpile weapon systems.
+ $ 4.5 million	Increase to **Experimental Activities** to support archiving and experimental activities, including complex subcritical experiments, in support of stockpile certification efforts.
+ $ 40.1 million	Continue planned growth in the **Accelerated Strategic Computing Initiative**, including support for accelerated 3-D code development, planned platform requirements, academic alliances, and accelerated distributive and distance computing.
- $ 8.7 million	Decrease to **Special Projects** reflecting the transfer of waste management activities to the waste generators.
+ $ 59.5 million	Increase to **Performance Assessment Science & Technology** to support additional hydrotest experiments, neutron science research at LANSCE, advanced hydrodynamics research, and verification and validation of systems modeling in support of annual stockpile certification.
+ $ 43.8 million	Increase to **Chemistry & Materials Science & Technology**, including verification and validation of materials modeling to address weapons aging and reliability issues and to support the reliability and surety of remanufactured components.
+ $ 18.7 million	Increase to **Stockpile Computing**, including continuation of the Numeric Environment for Weapons Simulation initiative which will create data exploration supercorridors to support large-scale data analysis by researchers and weapons assessment teams.
- $ 13.4 million	Reduction to **Testing Capabilities and Readiness** funding to support two subcritical experiments, a decrease from the FY 1999 funding level which supported three to four experiments.
+ $ 26.0 million	Initiate three new infrastructure projects: **Strategic Computing Complex** at LANL, **Terascale Simulation Facility** at LLNL, and **Joint Computational Engineering Laboratory** at SNL; continue funding for construction of **DARHT**; partially offset by decreases in funding requirements for ongoing Stewardship construction.

The budget request for the **Inertial Confinement Fusion** program is $465.7 million, a decrease of $37.7 million, or 7 percent, from the FY 1999 appropriation, reflecting the scheduled decrease in NIF construction funding and completion of the NIF optics pilot production. The NIF construction schedule is maintained within this request. Within the program, the National Ignition Plan is partially supported, with minimal development of NIF target diagnostics and experimental equipment, and the initiation of the NIF cryogenic handling system, originally planned for FY 2000, is delayed until FY 2001. Funding is included to utilize Omega for 18 weeks of weapons physics experiments by scientists from LANL and LLNL, the same as the FY 1999 level.

The budget request for **Technology Partnerships** is $22.2 million, a decrease of $20.9 million, or 48 percent, from the FY 1999 appropriation of $43.1 million. The FY 2000 request includes up to $5 million for AMTEX and up to $9 million for ACTI. The remaining $8.2 million will support ongoing R&D Cooperative Agreements. Some partnerships will begin transition to closeout in FY 1999 while others may be absorbed within other core stewardship efforts as appropriate.

The budget request for the **Education** program is 29.8 million, an increase of $20.8 million, associated with the transfer of funding responsibility from the Weapons Program Direction budget for the Los Alamos County School District (up to $8.0 million) and the Northern New Mexico Education Enrichment Foundation (a minimum of $6.0 million), support for the new National Atomic Museum ($5.5 million) to be built in northern Albuquerque, New Mexico, and an increase of $1.3 million to other Education activities.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	0	2,834	14,000	+11,166	+394.0%
Kansas City Plant	3,855	1,750	500	-1,250	-71.4%
Pantex Plant	0	388	5,388	5,000	+1288.7
Los Alamos National Laboratory	451,727	522,429	589,790	+67,361	+12.9%
Sandia National Laboratories	453,887	499,436	521,389	+21,953	+4.4%
Total, Albuquerque Operations Office	909,469	1,026,837	1,131,067	+104,230	10.4%
Chicago Operations Office					
Argonne Nat'l Lab	1,900	1,250	0	-1,250	-100.0%
Nevada Operations Office	183,644	199,264	198,106	-1,158	-0.6%
Oak Ridge Operations Office					
Oak Ridge Y-12	11,550	6,860	5,740	-1,120	-16.3%
OR Science & Technology Institute	149	147	150	+3	+2.0%
Oak Ridge National Laboratory	908	954	1,518	+564	+59.1%
Total, Oak Ridge Operations Office	12,607	7,961	7,408	-553	-6.9%
Oakland Operations Office					
General Atomics	10,937	8,870	7,000	-1,870	-21.1%
Lawrence Berkeley Nat' l Laboratory	6,374	15,112	23,018	+7,906	+52.3%
Lawrence Livermore Nat'l. Laboratory	690,183	760,061	806,336	+46,275	+6.1%
Naval Research Laboratory	9,000	16,758	9,500	-7,258	-43.3%
Oakland Operations Office	3,920	7,937	7,200	-737	-9.3%
University of Rochester	26,349	28,850	30,500	+1,650	+5.7%
Total, Oakland Operations Office	746,763	837,588	883,554	+45,966	+5.5%
Savannah River Operations Office					
Savannah River Westinghouse	1,515	1,907	1,900	-7	-0.4%
Headquarters	2,315	41,075	64,165	+23,090	56.2%
Subtotal, Stockpile Stewardship	1,858,213	2,115,882	2,286,200	+170,318	+8.0%
- Use of prior year balances	-454[a]	-7,359[b]	0	+7,359	-100.0%
Total, Stockpile Stewardship	1,857,759	2,108,523	2,286,200	+177,677	+8.4%

[a] Reflects Stockpile Stewardship allocation of appropriated use of prior year balances: Core Stewardship $ -359,000; ICF $ -52,000; and Technology Partnerships $ -43,000.

[b] Reflects reapplication of available prior year balances to cover FY 1999 program activities: Core Stewardship $ +3,676,000; and a reprogramming of $3,683,000 (98-R-4), approved November 1998.

Site Description

Weapons Stockpile Stewardship activities are conducted predominantly at the three weapons laboratories, Lawrence Livermore, Los Alamos, and Sandia National Laboratories in California and New Mexico, and at the Nevada Test Site. Funding is also provided to the University of Rochester, the Naval Research Laboratory, and General Atomics through the Inertial Confinement Fusion program and to various production sites for research and development activities related to Stockpile Stewardship. Other miscellaneous locations are funded through the Stockpile Stewardship program as noted on the Funding by Site table above.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL), established as a nuclear weapons design laboratory in 1943, is located on about 28,000 acres adjacent to the town of Los Alamos, New Mexico, which is approximately 25 miles northwest of Santa Fe.

The core competencies at LANL supporting the Stockpile Stewardship Program include theory, modeling and simulation, and high-performance computing to model a broad range of physical, chemical, and biological processes; complex experiments and measurements; nuclear and advanced materials; and nuclear weapons science and technology including the physics of nuclear weapons design and large-scale calculations of weapons phenomena. LANL also possesses unique capabilities in neutron scattering required for stockpile stewardship and enhanced surveillance and shares with LLNL the responsibility for the safety and reliability of the physics package in the Nation's nuclear weapons.

Among the major specialized facilities at LANL are the TA-55 Plutonium Facility for surveillance of plutonium "pits" and plutonium pit manufacturing, actinide research, and nuclear waste research and the Los Alamos Neutron Science Center user facility for supporting advanced materials science, nuclear science and particle-beam accelerator technology in addition to weapons surveillance. Two new facilities, the Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility and the Atlas pulsed power facility, are now under construction. DARHT's dual-axis, multi-time viewing capability will replace LANL's current diagnostic tool for hydrodynamic testing, the Pulsed High-Energy Radiographic Machine Emitting X-Rays, and provide crucial experimental data on many of the stockpile systems. Atlas will provide a pulse power experimental capability to address secondary weapons physics questions in a high energy density environment.

Sandia National Laboratories

The Sandia National Laboratories (SNL) are responsible for the nonnuclear components and systems engineering for all nuclear weapons and is a crucial point of contact with DoD in the areas of weapon requirements, system design, logistics, surveillance, training, and dismantlement. SNL manufactures certain nonnuclear components including neutron generators and is capable of providing an assured source of radiation hardened electronics. SNL provides unique capabilities in advanced manufacturing technology, microelectronics, and photonics and maintains distinctive competencies in engineered materials and processes, computational and information sciences, engineering sciences, and pulsed-power technology. Distributed Computing at a Distance, a component of the ASCI program, will originate at SNL.

Among the major specialized facilities at SNL are a Microelectronics Development Laboratory, a Combustion Research Facility for combustion science and laser spectroscopy, an Advanced

Manufacturing Processes Laboratory for rapid prototyping and assessing quality and reliability, an Intelligent Systems and Robotics Center supporting intelligent and agile manufacturing, and Pulsed Power Accelerators for testing and development of defense components.

Nevada Test Site

The Nevada Test Site (NTS), established in 1950, encompasses approximately 867,000 acres in Nye County in southern Nevada, about 65 miles northwest of Las Vegas. Since the U.S. Nuclear Testing Moratorium Act went into effect in early October 1992, no nuclear tests have been conducted by the United States.

The core mission at the NTS is to maintain the capability to conduct an underground nuclear test within 2-3 years of any such request by the President. Maintenance of this capability is required by Presidential Directive and is consistent with the Administration's Safeguards accompanying the Comprehensive Test Ban Treaty. To fulfill this mission, the necessary NTS infrastructure, facilities, and technical personnel are supported through exercises and experiments. Subcritical experiments sponsored by the nuclear weapons design laboratories (LANL and LLNL) serve a dual purpose of providing experimental data and exercising nuclear testing personnel skills; these experiments are the primary basis of maintaining nuclear test readiness.

General Atomics

General Atomics, located in La Jolla, California, is the current contractor for supplying the national laboratories with inertial confinement fusion targets for experimental campaigns.

Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory (LLNL), was established as a nuclear weapons design laboratory in 1952. It is located on 1.3 square miles in Livermore, California. It has an auxiliary testing range located on eight square miles situated about 18 miles east of the main site. LLNL's primary mission is to support DOE's Stockpile Stewardship Program to ensure that the nation's nuclear weapons remain safe, secure, and reliable and to prevent the spread and use of nuclear weapons worldwide. The laboratory brings to this mission extensive experience in supercomputing and laser technology as well as a broad range of world-class science and engineering capabilities, including nuclear science and technology and advanced sensors and instrumentation. LLNL has demonstrated successes in assembling multi-disciplinary approaches, applying expertise in advanced defense technologies, energy, environment, biosciences, and basic science, to complex national issues.

Among the major specialized facilities supporting LLNL's programmatic efforts are the ASCI Blue Pacific computer system for high-fidelity weapon simulation, the High Explosive Applications Facility for energetic materials research, the Flash X-Ray Facility for hydrodynamic tests, and the Nova laser which will be used for inertial fusion and weapon-physics research until its scheduled closure in FY 1999.

New projects are underway to prepare LLNL's capabilities for its critical responsibilities to maintain the nuclear deterrent without nuclear testing. The National Ignition Facility (NIF) has been under construction since June 1997 and will be the world's largest and most powerful laser facility when completed in FY 2003. NIF will perform fusion, weapon-physics, and weapon-effects experiments in support of the Stockpile Stewardship Program. An important step toward meeting the DOE's goal of establishing the advanced weapon simulation capability required by the Stockpile Stewardship Program

will be the construction of the Terascale Simulation Facility. The Contained Firing Facility is a hydrodynamic test facility that will be an environmental improvement to Livermore's existing Flash X-Ray Facility.

Naval Research Laboratory

The Naval Research Laboratory located in Washington, D.C. contributes to the national Inertial Confinement Fusion program through the use of its Krypton-fluoride Nike laser which was completed in FY 1995. Nike's capabilities are particularly useful for defining beam smoothness requirements for direct drive laser fusion ignition. In addition, the laboratory has strong capabilities in code development and atomic physics.

University of Rochester

The University of Rochester's Laboratory for Laser Energetics in Rochester, New York, operates its 60-beam glass laser, Omega, primarily for research on direct drive laser fusion. However, the Omega facility is increasingly being used to field weapons physics experiments by scientists from Lawrence Livermore National Laboratory and Los Alamos National Laboratory as operation of Nova ceases in FY 1999. The use of Omega for weapons physics will continue as the stockpile stewardship program transitions to the use of NIF beginning on the first bundle in FY 2002.

Core Stockpile Stewardship

Mission Supporting Goals and Objectives

The Core Stockpile Stewardship Program provides confidence in the safety and reliability of the U.S. nuclear weapons stockpile, and maintains a nuclear design capability for the indefinite future in the absence of new weapons requirements and underground nuclear testing. This program maintains the U.S. capability to resume underground nuclear testing within 2-3 years and provides the physical and intellectual infrastructure, including computational and simulation capabilities, required to meet the programmatic requirements of the science-based Stockpile Stewardship Program without underground nuclear testing. Primary locations of activity are the Lawrence Livermore, Los Alamos and Sandia National Laboratories and the Nevada Test Site. The Stockpile Stewardship Plan provides primary programmatic guidance.

Ongoing Activities

- Maintain and enhance an effective stockpile surveillance and evaluation program, including preventive maintenance for the stockpile;
- Continue to create and deploy leading-edge computational and simulation capabilities;
- Support advanced experimental facilities;
- Provide and enhance the research, development, and engineering capabilities required to refurbish and recertify the safety and reliability of the enduring stockpile; and
- Retain the ability to develop and support the manufacturing of replacement designs.

In FY 2000, the first steps will be taken to integrate the advanced computational and simulation models, methodologies, and materials models developed and matured within the Accelerated Strategic Computing Initiative (ASCI) with various relevant and complementary components of ongoing Core Stewardship activities. These integrated activities are key elements of the model and simulation-based capabilities needed to maintain the Nation's nuclear weapon stockpile. Advancements in systems modeling will be incorporated into the ongoing technical reviews of stockpile weapons conducted in support of the annual certification process. Materials models and databases will be utilized to address weapons aging and reliability issues and to support the reliability and surety of remanufactured components. Verified and validated primary and secondary codes will be used to support the surveillance, assessment and refurbishment of the weapons systems in the nuclear weapons stockpile. Integration of achievements from ASCI with the ongoing Core Stewardship program is essential to provide high confidence in the safety, security, reliability and performance of the enduring U.S. nuclear stockpile, without underground nuclear testing.

Budget Contents

Core Stockpile Stewardship is broken into the following major categories: **Direct Stockpile Activities, Experimental Activities, Accelerated Strategic Computing Initiative, Special Projects, Performance Assessment Science & Technology, Systems Components Science & Technology, Chemistry & Materials Science & Technology, Stockpile Computing, Testing Capabilities and Readiness, Institutional and Infrastructure Requirements, and Construction.**

Direct Stockpile Activities provide for initial design and development of all new weapon designs, if needed; preproduction design and engineering activities; design and development of weapon modifications; technical aspects of the laboratory surveillance and flight test program; and analysis behind safety studies and assessments. This program supports studies and research to apply basic science to weapon stockpile problems producing new technologies; products and processes in the vital surety areas (safety, security, and use control) technology development and implementation. The analysis needed to dismantle and safely store weapons being removed from the stockpile is provided. Verified and validated primary and secondary codes developed in the ASCI program will be integrated into the direct stockpile programs to support surveillance, assessment and refurbishment activities.

Experimental Activities support the ability to certify the enduring stockpile in the absence of underground nuclear testing, and improve our understanding of stockpile aging and the effects on reliability through experiments using high explosives and/or small quantities of special nuclear material. Experiments are conducted at the three nuclear weapons laboratories (Los Alamos, Lawrence Livermore, and Sandia National Laboratories) and at the Nevada Test Site (NTS). The experiments at the NTS also directly support Presidential direction to maintain the ability to safely conduct an underground nuclear test at the NTS within 2-3 years. Funding for the NTS contractors who support these experiments is included in the Testing Capabilities and Readiness budget category.

An important component of the experimental program is the subcritical experiments. Subcritical experiments are scientific experiments using chemical high explosives to generate high pressures which are applied to nuclear materials. High speed measurement instruments are used to obtain valuable scientific data about the behavior of those nuclear materials under conditions similar to those during the implosion phase of a nuclear weapon. The configuration and quantities of explosives and nuclear materials are designed so that no nuclear explosion will take place. The data obtained from subcritical experiments will help benchmark complex computer simulations of nuclear weapons performance and will be used to help certify the safety and reliability of the Nation's nuclear weapons stockpile. With the moratorium on underground nuclear testing, scientists and engineers compare experimental data with data from prior underground nuclear tests in order to validate or modify computational codes.

Accelerated Strategic Computing Initiative (ASCI) supports Defense Programs' response to the Presidential decision to pursue a zero-yield Comprehensive Test Ban Treaty. ASCI will build upon the successes achieved with the demonstrated 1 TeraOp performance on the Option Red and recent demonstrated performance of over 3 TeraOps on the Option Blue platforms ahead of schedule. ASCI continues its' balanced approach to implementing the program through highly integrated strategies, such as, Advanced Applications; Platforms; Problem Solving Environments; Strategic Alliances; One Program\Three Labs; and Distributed Computing and Distance Computing, ($DisCom^2$). The ASCI program has developed high-end simulation capabilities (Advanced Applications and Platforms) needed to meet weapons assessment and certification (Problem Solving Environments and Advanced Applications) requirements without nuclear testing. The supercomputers developed under the ASCI program, along with associated diagnostic, modeling, and validation technologies, $DisCom^2$, and the Numeric Environment for Weapons Simulation, are key to supporting the execution of the Stockpile Stewardship Program. These strategies, taken collectively, are being pursued to accelerate the development of simulation codes, computer platforms and computing environments needed to address the challenges of credibly simulating the performance, safety, and reliability of the enduring nuclear stockpile with unprecedented levels of data fidelity.

Special Projects provide miscellaneous research, development and support activities necessary to carry out the Stockpile Stewardship Program, but which do not programmatically fit into any other category. Waste Management is included in this program.

Performance Assessment Science and Technology supports theoretical and experimental weapons physics research with an emphasis on anticipated future national security missions and requirements. This includes technical reviews of stockpile weapons conducted in support of the annual certification process, hydrotest and pulsed power experiments, in addition to advanced hydrotest and advanced pulsed power research. Advanced systems modeling developed under ASCI is utilized to address ongoing stockpile weapon system performance issues.

Systems Components Science and Technology includes research emphasizing the integration of warhead systems with delivery systems, and advancement of subsystem enabling technologies. This research includes component modularity, standardization, and reuse; utilization of microelectronic systems to improve safety, security and reliability; and development of the tools, methods, and processes needed to support future design and manufacturing requirements.

Chemistry and Materials Science and Technology provides research in materials science to address the unique set of issues relating to the specialized materials developed for, and used in, nuclear weapons. These activities are required to address the resolution of weapons aging and reliability issues; to support the remanufacture of stockpile components in a timely, cost effective, and environmentally benign way; and to enhance the reliability and surety of remanufactured components. Materials models and databases developed within ASCI are employed to address ongoing weapons issues in materials science.

Stockpile Computing conducts computing operations, develops models and provides code maintenance to support execution of Stockpile Stewardship. Stockpile Computing supports the development, enhancement, and maintenance of simulation codes and databases for the weapons program and research in theoretical physics, mathematical modeling, software and algorithms. These activities are essential in weapons safety and reliability assessments, stockpile life extension endeavors, design of physics experiments, developing appropriate diagnostics, and analyzing past nuclear experimental results. Areas of current and planned efforts include: assessments of complex/unique accident scenarios; improvements of predictive capability for weapon safety and performance analysis; improvement in weapon materials dynamic response models; multi-dimensional simulation of physics; visualization tools; and robotics algorithms.

The Stockpile Computing initiative entitled the Numeric Environment for Weapons Simulation (NEWS), begun in FY 1999, increases substantially in FY 2000 as planned, to keep pace with, and provide commensurate computational and computer infrastructure with planned program performance curves. The NEWS combines simulation codes and platforms with problem solving tools and visualization tools to allow large numbers of designers to use high-end simulation capabilities to address time-urgent stockpile issues such as surveillance, aging and re-manufacturing.

Testing Capabilities and Readiness provides a continental U.S. site for underground nuclear weapons testing at the Nevada Test Site (NTS). Consistent with Presidential direction, Defense Programs is required to maintain a readiness capability to safely conduct an underground nuclear test at the NTS within 2-3 years, if needed. In addition to maintaining the appropriate infrastructure, personnel, knowledge, and skills to meet this requirement, measures are to be taken to assure continued

environmental, worker health, public safety, and physical protection. Presidential direction also requires that sufficient resources should be included to conduct experimental activities planned by the three nuclear weapons laboratories (Los Alamos, Lawrence Livermore, and Sandia National Laboratories).

In FY 1998, Defense Programs successfully conducted the third and fourth subcritical experiments, "Stagecoach" and "Bagpipe," which provided data to improve the accuracy of computer simulations of nuclear weapons as part of the science-based Stockpile Stewardship Program, and were used to develop and refine diagnostics for the more complex subcritical experiments of the future. Extensive preparatory work was conducted on two experiments planned for FY 1999; it should be noted that most of the work and expenditures for an experiment occur prior to the actual date that the experiment occurs. In FY 1999 the first of those subcritical experiments, "Cimarron," was conducted on December 11, 1998. The next planned experiment, "Clarinet," is scheduled for the second quarter of FY 1999. Two subcritical experiments are planned for FY 2000. We expect that this effort will be maintained at 2 or 3 experiments annually throughout the planning period. Activities supporting the experimental program conducted at NTS by the laboratories also exercise skills needed to maintain test capabilities and readiness.

Institutional and Infrastructure Requirements evolved from a programmatic laboratory capital equipment and general plant project (GPP) budget category to institutional infrastructure support for Core Stockpile Stewardship sites. Funding in this category supports multiple laboratory programs or is of a basic infrastructure nature and therefore are not allocated to other Core Stockpile Stewardship Operations & Maintenance budget categories. Capital equipment or general plant project funding directly associated with a programmatic activity is budgeted accordingly.

Construction projects for Core Stockpile Stewardship, both programmatic and infrastructure in nature, support the DP mission at the three nuclear weapons laboratories and the Nevada Test Site. Details for all of the construction projects are included in the construction project data sheets.

Performance Measures (Presidential Measures are underlined)

- Meet all annual weapons alteration and modification schedules developed jointly by DOE and DoD.
- Conduct studies and development work required to support weapon systems and components for the future stockpile.
- Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety and reliability of the nuclear weapons stockpile.
- Revalidate enduring stockpile systems to meet established military characteristics.
- Provide computer platforms sized to support the stewardship objective of full physics, high-fidelity simulations of nuclear weapons performance.
- Deliver three-dimensional, high-fidelity weapons performance codes by 2004.
- Demonstrate a computer code capable of performing a three-dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an ASCI computer system.

- Develop and implement visualization, networking and data management systems to efficiently support utilization of ASCI codes and computers across the weapons complex.
- Meet all cost and schedule goals for construction of the Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) consistent with an FY 2002 completion.
- Meet all cost and schedule goals for construction of the Contained Firing Facility at LLNL consistent with a 4th Quarter FY 2001 completion.
- Meet all cost and schedule goals for construction of the Atlas Facility at LANL consistent with a 1st Quarter FY 2001 completion.
- Obtain and assess information required to decide whether to construct 1) an advanced hydrotest facility and/or 2) an advanced pulsed power facility.
- Conduct two subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon.
- Conduct experimental and theoretical research necessary to maintain or advance research, development and engineering capabilities in nuclear materials science and weapons design.
- Conduct high energy density research on inertial confinement fusion facilities necessary to enhance understanding of areas of physics relevant to a better predictive assessment of nuclear weapons performance.
- Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan are operational.
- Adhere to schedules set forth in the Advanced Manufacturing, Design and Production Technology Multi-Year Program Plan.
- Implement the Strategic Alignment Initiative and recommendations of the 120-Day Study.
- Continue material protection, control, and accountability upgrades at three DOE facilities with weapons-usable material.
- Ensure that the capability to resume underground nuclear testing is maintained, in accordance with the Presidential Decision Directive and Safeguard C of the CTBT.
- Adhere to schedules for the safe and secure dismantlement of approximately *375* nuclear warheads that have been removed from the U.S. nuclear weapons stockpile.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations and Maintenance					
Direct Stockpile Activities	179,103	177,848	215,452	+37,604	+21.1%
Experimental Activities	57,120	54,526	59,011	+4,485	+8.2%
Accelerated Strategic Computing Initiative	223,529	300,926	341,000	+40,074	+13.3%
Special Projects	15,485	92,012	83,278	-8,734	-9.5%
Performance Assessment Science & Technology	248,593	237,559	297,100	+59,541	+25.1%
Systems Components Science & Technology	114,253	101,680	102,830	+1,150	+1.1%
Chemistry & Materials Science & Technology	57,258	59,250	103,084	+43,834	+74.0%
Stockpile Computing	150,560	182,800	201,500	+18,700	+10.2%
Testing Capabilities & Readiness	180,977	190,500	177,126	-13,374	-7.0%
Institutional & Infrastructure Requirements	54,226	56,201	54,974	-1,227	-2.2%
Total, Operations and Maintenance	1,281,104	1,453,302	1,635,355	+182,053	+12.5%
Construction	98,810	107,126 [a]	133,145	+26,019	+24.3%
Total, Core Stockpile Stewardship	1,379,914	1,560,428	1,768,500	+208,072	+13.3%

[a] Reflects reprogramming of $3,683,000 (98-R-4), approved November 1998.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Direct Stockpile Activities			
■ The Stockpile Readiness Program supports activities on stockpile weapons to maintain or expand the understanding on the original development work, assess current reliability and safety status, respond to design issues and questions, and support the multi-agency Project Officers Group for each weapon system	53,344	55,593	61,295
■ The Stockpile Reduction Program develops dismantlement procedures, provides liaison and technical support, and assists in the dismantlement of weapons and components designed by each weapons design laboratory	9,680	9,122	8,444
■ The Enduring Stockpile Program includes revalidation of enduring stockpile weapon systems to meet military characteristics and development work necessary for refurbishment efforts like the W87 Peacekeeper Stockpile Life Extension Program (SLEP)	75,963	76,318	62,297
■ The Future Stockpile Program includes activities directed toward possible future stockpile modifications such as the Submarine Launched Ballistic Missile (SLBM) Warhead Protection Program (WPP), a cooperative program between the Navy and DOE to exercise and maintain expertise for SLBM systems and to demonstrate replacement warhead options for possible future deployment, if needed. The Stockpile Life Extension Programs (SLEP) will provide Full Scale Engineering Development (FSED) and other required phase 6.2A and 6.3 activities for the W76 and W80; including support for the refurbishment First Production Unit (FPU) date of FY 2005 for the W76 and FY 2006 for the W80	40,116	36,815	60,016
■ Systems verification and validation simulation efforts, incorporating the advanced computation and simulation of primary and secondary codes, to support stockpile weapon systems	0	0	23,400
Total, Direct Stockpile Activities	179,103	177,848	215,452

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Experimental Activities			
■ Archiving activities to identify and preserve information on stockpile weapon design parameters, production and engineering data, and data from nuclear and nonnuclear tests that support the certification of current stockpile weapons ...	13,482	12,595	13,796
■ Hydrodynamic experiments to assess nuclear components including subcritical experiments. Two subcritical experiments will be conducted in FY 2000	36,638	33,521	37,246
■ Aboveground experiments to assess and certify nonnuclear stockpile weapons subsystems and component hardware to neutron, x-ray, and gamma-radiation	7,000	8,410	7,969
Total, Experimental Activities	57,120	54,526	59,011
Accelerated Strategic Computing Initiative (ASCI)			
■ Advanced Applications / Problem Solving Environments efforts greatly enhance physics in 3-D computer codes that provide unprecedented levels of fidelity in weapons simulations to maintain the path forward to the goal of 100 TeraOps performance through intermediate milestones of 10 and 30 TeraOps planned for 2000 and 2002, respectively. FY 2000 efforts in Advanced Applications will focus on 3-D codes capable of demonstrating the dynamic behavior of a nuclear weapons primary and demonstration of the dynamic response of a weapon system in the hostile radiation and blast of reentry	132,801	144,750	115,912
■ Problem Solving Environments involves crosscutting support to the other strategies in ASCI and involves working closely with U.S. industry to accelerate development and mitigate impediments to provide computer systems far exceeding current industry projections, but essential to Stockpile Stewardship	23,683	44,300	58,286

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Platforms activities provide the supercomputer systems needed to attain the planned path forward to the goal of 100 TeraOps performance level by 2004. Intermediate milestones of 10 and 30 TeraOps will be met in FY 2000 by completing and installing a basic development environment for the 10 TeraOps Option White system and completing acceptance of this system. Selection of a 30 TeraOps computer supplier is also planned for FY 2000	37,955	55,400	78,300
■ Strategic Alliances will allow the ASCI program to engage U.S. universities on critical simulation capability problems addressing physics, materials modeling, fire and explosives safety and computer science issues in Level I Alliance. In FY 2000 each Alliance Level I center is expected to complete an integrated application code and demonstrate it on an ASCI computer system	24,938	12,490	32,400
■ Distributed Computing and Distance Computing ($DisCom^2$) efforts will continue with this strategy which was begun in FY 1999, that will enable the ASCI and Stockpile Computing program to deliver key remote computing, visualization and communications technologies that complement the ASCI vision	0	25,950	47,192
■ Verification and validation efforts begun in FY 1999 have been integrated in the core program to utilize direct stockpile data	0	10,150	0
■ One Program / Three Labs continues with its integration strategy and provides the means to leverage other ASCI strategies and provides an appropriate level of coordination among the labs	4,152	7,886	8,910
Total, Accelerated Strategic Computing Initiative (ASCI)	223,529	300,926	341,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Special Projects			
■ Waste Management and other activities which do not fit into other budget categories, or for which special visibility is necessary. This category includes funding for Waste Management at Los Alamos and Sandia National Laboratories in FY 1999 and FY 2000; a portion of the funding in FY 2000 at Sandia for Waste Management is funded by Stockpile Management	599	77,540	70,363
■ Extraordinary ES&H Site Remediation activities address one-time corrective actions such as decontamination, decommission and demolition of surplus facilities at Sandia National Laboratories, and the "re-canning" of stored plutonium at Lawrence Livermore National Laboratory under the Defense Nuclear Facilities Safety Board Recommendation 94-1	2,523	2,419	1,394
■ The Joint DoD/DOE Munitions Technology Development Program leverages the resources of the Department of Defense and the DOE to improve the capabilities of nonnuclear munitions technology and advance the science base for nuclear stockpile stewardship in areas of mutual interest between the two agencies. Activities are coordinated through a 5-year plan that is updated and approved annually by both agencies	11,463	11,035	10,501
■ Nuclear Criticality activities at Los Alamos National Laboratory in response to the Department's Implementation Plan for the Defense Nuclear Facilities Safety Board Recommendation 97-2	900	1,018	1,020
Total, Special Projects	15,485	92,012	83,278
Performance Assessment Science & Technology			
■ Performance assessment activities to explore concepts and technologies that offer potential options for meeting future national security requirements. These activities do not involve formal hardware development; however, they may include a limited amount of prototyping or experimentation to assess or demonstrate conceptual feasibility and they often require intensive computational analysis	65,891	52,224	47,407

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Basic weapons physics research for both nuclear and nonnuclear components, radiation source development, and development of improved diagnostics for use in aboveground experimental facilities. Issues involving hydrodynamics, radiation, plasma, nuclear, solid state, optical, and chemical physics are being addressed to improve understanding of physics and code validation, and to sustain the skills of theoretical and experimental scientists. Weapons-related physics experiments on inertial fusion facilities are also supported. Pulsed power experiments are conducted on Pegasus, Z, Atlas, and Saturn; and hydrotest experiments are conducted at PXR and Phermex	136,819	134,871	143,757
■ The Los Alamos Neutron Scattering Center (LANSCE) is the primary facility for Stockpile Stewardship Program researchers to conduct research addressing issues in neutron science. Defense Programs maintenance of this facility allows it to support other users within DOE	33,721	34,893	38,423
■ Advanced Hydrodynamic Radiography conducts research in and develops linear induction accelerator technology, inductive voltage adder technology, and proton radiography as technology options for a future Advanced Hydrotest Facility	12,162	15,571	19,671
■ Advanced systems modeling developed in ASCI to address ongoing stockpile weapon system performance issues	0	0	47,842
Total, Performance Assessment Science and Technology	248,593	237,559	297,100
Systems Components Science and Technology			
■ Systems Engineering activities which facilitate the incorporation of new technologies into weapon systems and stockpile stewardship operations	64,165	56,482	56,268
■ Electronics, Photonics, Sensors and Mechanical Components support research in enabling technologies which control and operate nuclear weapons including intelligent systems which monitor and diagnose the condition of weapons with regard to aging, functional status, intrusion/tamper detection, and anticipated performance	33,188	34,470	36,361

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Advanced Manufacturing efforts develop the cost-effective, environmentally acceptable product realization tools, methods, and processes in direct support of the nuclear weapons stockpile	16,900	10,728	10,201
Total, Systems Components Science and Technology	114,253	101,680	102,830
Chemistry and Materials Science and Technology			
■ Chemistry and Materials supports research on materials synthesis and processing, determination of materials structure and composition, and development of functional properties in polymers, metals, ceramics, inorganic and organic materials, composites, and salts	13,098	12,935	11,949
■ High Explosives involves fundamental physics and chemistry of explosive materials, characterization and modeling of explosive properties, improvement of firing technology, investigation of demilitarization technologies, and engineering of explosive component prototypes and their evaluation for weapons use	14,768	17,283	17,830
■ Special Nuclear Materials activities support the development of advanced and automated processing, casting, dynamic testing and machining technologies for beryllium, plutonium, and uranium	24,114	22,931	24,644
■ Tritium activities support research on the production, disassembly, handling, and use of tritium and its compatibility with other materials and components and focuses on four main areas: gas transfer, solid storage systems, neutron generator tubes, and inertial fusion targets	5,278	6,101	6,161
■ Materials models and databases developed within ASCI are combined with ongoing materials modeling efforts to address ongoing weapons issues in materials science	0	0	42,500
Total, Chemistry and Materials Science and Technology	57,258	59,250	103,084

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Stockpile Computing			
■ Stockpile Computing base program activities will continue along with code development and maintenance efforts to improve 3-D "more complete physics" modeling codes in support of the enduring stockpile	150,560	155,200	134,230
■ Numeric Environment for Weapons Simulation will provide implementation of a local computational environment for a large number of weapons designers to use high end simulation capabilities, such as rapid visualization of stockpile surveillance activities in order to "see and understand" the effects of aging on the stockpile and its associated phenomena	0	27,600	67,270
Total, Stockpile Computing	150,560	182,800	201,500
Testing Capabilities and Readiness			
■ Supports Defense Programs' plans to conduct two subcritical experiments in the U1a complex at the NTS in FY 2000. Also includes funding for upgrades and expenses of the U1a complex in accordance with the upgrade plan	60,090	63,341	48,930
■ Support to the weapons laboratories for nonnuclear experiments conducted at the NTS, primarily at the Big Explosive Experimental Facility (BEEF)	4,733	3,255	4,700
■ Support to the weapons laboratories for experimental activities at locations other the NTS (mainly the weapons laboratories)	18,343	19,106	18,857
■ Experimental diagnostics activities which support experiments conducted both on and off the NTS, including some potentially used for the NIF, and in support of the nuclear test readiness mission	10,948	14,767	20,266
■ Support for activities vital to maintaining a capability to resume underground nuclear testing within 2-3 years that are not exercised as a byproduct of the experimental program	34,888	30,410	29,023

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Technical Facility Operations and Management supports experimental and nuclear test readiness functions, including operations of the Device Assembly Facility (DAF), and the two-stage gas gun (R&D, general plant project, operational testing, and startup)	19,704	24,446	24,902
■ Other activities supporting the direct program, including the Cooperative Agreement with the University of Nevada, and the radio upgrade project at the NTS	32,271	35,175	30,448
Total, Testing Capabilities and Readiness	180,977	190,500	177,126
Institutional & Infrastructure Requirements			
■ Institutional Capital Equipment that supports multiple laboratory programs or is of a basic infrastructure nature and therefore is not allocated to other Core Stockpile Stewardship Operations & Maintenance budget categories	39,122	37,001	36,774
■ Institutional General Plant Projects that supports multiple laboratory programs or is of a basic infrastructure nature and therefore is not allocated to other Core Stockpile Stewardship Operations & Maintenance budget categories. Examples include: decontamination & decommissioning refueling and service facility, removal of adjacent transportables, inadequate parking at technical area 3, etc.	15,104	19,200	18,200
Total, Institutional & Infrastructure Requirements	54,226	56,201	54,974
Construction			
■ See "Capital Operating Expenses and Construction Summary" for details	98,810	107,126	133,145
Total, Core Stockpile Stewardship	1,379,914	1,560,428	1,768,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Direct Stockpile Activities	
■ Decreased laboratory support for the dismantlement program and other minor program reallocations consistent with Nuclear Weapons Stockpile Memorandum (NWSM) defined workload	-4,314
■ Decreased development work to support for the W87 Peacekeeper Stockpile Life Extension Program (SLEP) to reflect first production and certification in FY 1999	-7,230
■ Conduct Full Scale Engineering Development activities and other required activities to support refurbishment First Production Unit date of 2005 for the W76 Trident SLEP	+21,000
■ Develop and validate potential refurbishment options within the Submarine Launched Ballistic Missile (SLBM) Warhead Protection Program (WPP)	+4,748
■ Systems verification and validation efforts have been integrated into this budget category to utilize direct stockpile data	+23,400
Total, Direct Stockpile Activities	+37,604
Experimental Activities	
■ FY 1999 activities in this area were reduced as a result of the unavailability of prior year balances to offset the final FY 1999 appropriation (impacts and allocations of these program reductions have not been finalized at the subprogram activity level); FY 2000 activities approximate the FY 1998 program level and support two subcritical experiments. Archiving and experimental activities by the weapons laboratories support both test readiness and certification of the nuclear stockpile	+4,485
Accelerated Strategic Computing Initiative	
■ ASCI increases in the 5th year of the program are planned to accomplish the program goal of attaining 100 TeraOps of computational performance by 2004 as well as intermediate milestones of 10 and 30 TeraOps planned for 2000 and 2002, respectively. In FY 2000, ASCI activities grow by 13 percent, attributable to the following planned growth in the program elements	
■ Advanced Applications \ Problem Solving Environments decreases 8 percent to reflect integration of models and systems developed in ASCI into ongoing core stewardship activities, and reflects efficiencies in code compilation efforts	-14,852

	FY 2000 vs. FY 1999 ($000)
■ Platforms increases $22.9 million, or 41 percent, to support the completion efforts of the 3 TeraOps Option "Blue" system and the planned technology refreshes associated with this system as well as costs associated with the 10 TeraOps Option White system.	+22,900
■ Strategic Alliances increases to continue funding of the existing Level I Alliance Agreements with academia as well as initiate some Level II and III Alliance proposals. Recipients of Alliance work to date include the California Institute of Technology, Stanford University, the University of Chicago, the University of Utah and the University of Illinois at Urbana/Champaign. Types of approved Alliance work include: simulation of dynamic responses of metals; turbulence simulations; astrophysics; and fire and explosives safety.	+19,910
■ One Program\Three Labs increases 13 percent and represents the continuation of the strategy to integrate and align the weapons laboratories with each other and the complex to fulfill ASCI mission goals. This strategy encompasses the planned program collaboration meetings, topical and Principal investigators meetings, program planning, outreach and crosscuts.	+1,024
■ Verification and Validation decreases as matured codes are integrated in the core program to utilize direct stockpile data.	-10,150
■ Distributed Computing and Distance Computing (DisCom^2) increases 82 percent to accelerate the development and deployment of a pre-eminent design, analysis, and (re)manufacturing capabilities that will serve as an enterprise-wide computational fabric which extends the required simulation environments to support high-end computing at remote sites	+21,242
Total, Accelerated Strategic Computing Initiative	+40,074
Special Projects	
■ Funding decrease reflects the allocation of the cost of waste management activities at SNL to waste generators	-6,107
■ Funding decrease for Extraordinary ES&H Site Remediation, DoD Munitions MOU, and other miscellaneous activities	-2,627
Total, Special Projects	-8,734

	FY 2000 vs. FY 1999 ($000)
Performance Assessment Science and Technology	
■ Minor program reallocations to support the certification of the stockpile and advanced experimental capabilities	-712
■ Increased support to conduct hydrotest experiments in support of certification and to establish a baseline from which future changes to stockpile weapons can be detected and measured	+4,781
■ Conduct neutron science research at the LANSCE facility, increase operating beam time by two months, and utilize two new "fast track" spectrometers	+3,530
■ Increase support to conduct research in and develop linear induction accelerator technology, inductive voltage adder technology, and proton radiography as technology options for a future Advanced Hydrotest Facility	+4,100
■ Advanced systems modeling being verified and validated and integrated into ongoing technical reviews	+47,842
Total, Performance Assessment Science and Technology	+59,541
Systems Components Science and Technology	
■ FY 1999 activities in this area were reduced as a result of the unavailability of prior year balances to offset the final FY 1999 appropriation (impacts and allocations of these program reductions have not been finalized at the subprogram activity level); FY 2000 activities approximate the revised FY 1999 program level	+1,150
Chemistry and Materials Science and Technology	
■ Materials models and databases developed in ASCI will be verified and validated and integrated into ongoing materials research to address weapon aging and remanufactured component reliability and surety issues	+42,500
■ FY 1999 activities in the balance of this area were reduced as a result of the unavailability of prior year balances to offset the final FY 1999 appropriation (impacts and spreads of these program reductions have not been finalized at the subprogram activity level); FY 2000 activities approximate the revised FY 1999 program level	+1,334
Total, Chemistry and Materials Science & Technology	+43,834

	FY 2000 vs. FY 1999 ($000)
Stockpile Computing	
■ The Stockpile Computing base program decreases 14 percent, based on planned workload requirements relating to hardware and software maintenance; computer operations; system administration, support and integration; configuration and resource management; computer security; and integration of systems. System networks upgrades to enhance data transfer speeds and data storage continue to expand as technology for high density storage advances	-20,970
■ Numeric Environment for Weapons Simulation (NEWS), begun in FY 1999, increases to provide data exploration corridors commensurate with ASCI program advances in the advanced applications; platforms; and problem solving environments strategies	+39,670
Total, Stockpile Computing	+18,700
Testing Capabilities and Readiness	
■ Defense Programs plans to conduct two subcritical experiments in the U1a complex at the Nevada Test Site (NTS) in FY 2000. The FY 1999 funding level supported 3 to 4 subcritical experiments	-10,711
■ Funding for upgrades and expenses of the U1a complex decrease in accordance with the upgrade plan	-3,700
■ Minor program reallocations to support the experimentation and nuclear test readiness objectives at the NTS	+1,037
Total, Testing Capabilities and Readiness	-13,374
Institutional & Infrastructure Requirements	
■ Funding for institutional capital equipment and general plant projects is decreased due to the need to maintain scientific and technical staff and experimental facilities	-1,227

	FY 2000 vs. FY 1999 ($000)
Construction	
■ Core Stockpile Stewardship Construction continues funding of all ongoing construction projects and initiates three new infrastructure projects in FY 2000. The three new projects will provide the unique floor space and scalable architecture for power and cooling capabilities needed at the laboratories to house state-of-the-art computers as well as provide visualization and other capabilities to maximize the utility of the significant advances in computing capabilities by the weapon designers. Construction of these facilities is supported through the 5-year period ...	+26,019
Total Funding Change, Core Stockpile Stewardship	+208,072

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects [a]	22,948	23,000	23,000	0	0.0%
Capital Equipment [b]	58,259	59,000	59,000	0	0.0%
Total, Capital Operating Expenses	81,207	82,000	82,000	0	0.0%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998	FY 1999	FY 2000	Unappro-priated Balance
00-D-107, Joint Computational Engineering Laboratory (JCEL), SNL	28,870	0	0	0	1,800	27,070
00-D-105, Strategic Computing Complex, LANL	100,000	0	0	0	26,000	74,000
00-D-103, TeraScale Simulation Facility, LLNL	83,500	0	0	0	8,000	75,500
99-D-108, Renovate Existing Roadways, NV	11,005	0	0	2,000	7,005	2,000
99-D-106, Model Validation & System Certification Test Center, SNL	18,230	0	0	1,600	6,500	10,130
99-D-105, Central Health Physics Calibration Facility, LANL	3,900	0	0	2,900	1,000	0
99-D-104, Protection of Real Property-Roof Reconstruction-Ph. II, LLNL	19,900	0	0	2,500	2,400	15,000
99-D-103, Isotope Sciences Facility, LLNL	17,400	0	0	2,000	2,000	13,400
99-D-102, Rehabilitation of Maintenance Facility, LLNL	7,900	0	0	4,000	3,900	0
97-D-102, Dual-Axis Radiographic Hydrotest Facility, LANL	259,700	81,400	46,300	36,000	61,000	35,000
96-D-105, Contained Firing Facility Addition, LLNL	49,700	23,700	19,300	6,700	0	0

[a] Since funds are appropriated for Operations and Maintenance, which includes operating expenses, capital equipment and general plant projects, we no longer budget separately for capital equipment. Funding shown reflects estimates based on FY 1998 obligations.

[b] Since funds are appropriated for Operations and Maintenance, which includes operating expenses, capital equipment and general plant projects, we no longer budget separately for general plant projects. Funding shown reflects estimates based on FY 1998 obligations.

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
96-D-104, Processing & Environmental Technology Laboratory, SNL	45,900	16,080	0	18,920	10,900	0
96-D-103, Atlas, LANL	43,300	23,500	13,400	6,400	0	0
96-D-102, Stockpile Stewardship Fac. Revit. Ph. VI, VL:						
- Water Well Replacements, LANL	16,800	11,200	4,500	1,100	0	0
- Fire Protection Improvements, LANL	16,900	6,570	5,450	4,880	0	0
- 138kV Substation Modernization, NTS	11,992	1,000	2,667	6,350 [a]	1,975	
- Real Property Protection (Roofs), LLNL	7,810	3,000	4,810	0	0	0
- Storm Drain, Sanitary Sewer & Domestic Water, SNL	15,374	0	1,483	7,326	665	5,900
- Site 300 Fire Station/Medical Facility, LLNL	5,350	0	900	4,450	0	0
Total, Core Stewardship Construction		166,450	98,810	107,126	133,145	258,000

Major Items of Equipment *(TEC $2 Million or Greater)*

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
Short Pulse Spallation Source	16,400	3,000	6,000	7,700	0	FY 2000
Radio Conversion	18,000	0	0	3,000 [b]	6,000	FY 2002
Plasma Deposition Tool	2,200	0	0	2,200	0	FY 1999
Deep Ultraviolet Stepper	4,000	0	0	0	4,000	FY 2000
Total, Major Items of Equipment		3,000	6,000	12,900	10,000	

[a] Reflects reprogramming of $3,683,000 (98-R-4), approved November 1998.

[b] Reflects reallocation of operations and maintenance funding within Testing Capabilities and Readiness.

Inertial Confinement Fusion

Mission Supporting Goals and Objectives

The mission of the Inertial Confinement Fusion (ICF) program is twofold: (1) to address high energy density physics issues as a key component of the science-based Stockpile Stewardship program, and (2) to develop a laboratory microfusion capability for defense and energy applications. The near-term goals pursued by the ICF program in support of this mission are demonstrating ignition in the laboratory and expanding the program's capabilities in high energy density science. The National Ignition Facility (NIF) is the cornerstone of this effort.

The program contributes to the goals of the Weapons Stockpile Stewardship program by:

- providing facilities and capabilities needed to study many of the basic and applied science issues underlying stockpile stewardship;
- conducting experiments to validate and verify the advanced weapons simulation codes being developed by the core nuclear weapons program and the Accelerated Strategic Computing Initiative (ASCI) to assess the reliability and effects of aging on weapons in the stockpile;
- providing calculational techniques to model high energy density phenomena in new simulation codes; and
- helping to retain the high quality of scientific and technical expertise necessary for national security.

Technical Background

ICF focuses energy from a "driver," typically a laser or ion beam accelerator, to implode and compress a small, spherical capsule shell containing deuterium and tritium (DT) fuel. The "inertia" of the compressed fuel keeps the reactants together long enough, under the proper conditions, for the fusion ignition and burn to occur. The goal is to achieve "gain," that is, to get more energy out of the system than was put into the system. The ICF capsule can be imploded in one of two ways: direct or indirect drive. In the direct drive approach, the driver energy is focused directly onto the capsule to drive the implosion. In the indirect drive approach, the driver energy is directed into a radiation enclosure, or hohlraum, generating a uniform soft x-ray environment which then drives the capsule. In either case, the irradiation energy must be uniformly absorbed in the capsule's outer ablator layer. The heated ablator material rapidly blows off symmetrically. The rocket-like reaction force causes the "pusher" and the remaining portion of the fuel capsule to spherically implode, compressing and heating the DT fuel to ignition. The same technique that provides capsule implosion provides radiation environments for the study of high energy density physics that occur in weapons. Experiments on ICF facilities can also address radiation flow, hydrodynamics, equation of state and opacity issues specifically for weapon analyses.

The ICF program has developed unique capabilities in pursuit of its national mission. The laser and pulsed power facilities developed under the ICF program, along with associated diagnostic, modeling, and target fabrication components, are the most advanced array of high energy density physics research capabilities in the world. These facilities support science based stockpile stewardship while advancing inertial fusion technology toward a laboratory ignition demonstration with multi-megajoule fusion

yields. Over the next five years, most of the ICF resources are allocated to an integrated theoretical and experimental program (high energy density physics studies, target fabrication, laser science, computation) to advance the technology in support of achieving ignition and other weapon physics experiments. Demonstration of ignition and burn in the laboratory is the most challenging goal of the National Ignition Facility (NIF), which is using glass laser technology and is on schedule to be completed at the end of FY 2003.

Program Goals

- Demonstrate fusion ignition in the laboratory.
- Provide access to physics regimes of interest in nuclear weapon science and investigate physics issues.
- Expand the aboveground simulation capability for nuclear weapons effects.
- Develop diagnostic instruments applicable to weapons stockpile stewardship research.
- Develop and experimentally benchmark computational models, including testing of three-dimensional simulation capabilities.
- Attract and retain highly competent scientists and engineers within the nuclear weapons program.

Program Facilities

- Beamlet: a scientific prototype of one beam of the NIF located at LLNL . It began operating experiments in 1994. It was shut down during FY 1998 and was shipped to SNL for use as a "backlighter" diagnostic on the Z facility.
- National Ignition Facility (NIF): a 192-beam neodymium (Nd) glass laser being built at Lawrence Livermore National Laboratory (LLNL). It is scheduled to be completed at the end of FY 2003.
- Nike: a Krypton-fluoride (KrF) laser located at the Naval Research Laboratory (NRL). It was completed in FY 1995 and is being used primarily to define beam smoothness requirements for direct drive laser fusion.
- Nova: a ten-beam glass laser located at LLNL. It has been the program's major facility for research on indirect drive laser fusion, and has made important contributions to stockpile stewardship and basic experiments on high energy density physics since it began operating in 1985. Nova will be shut down in FY 1999.
- Omega: a 60-beam glass laser used primarily for research on direct drive laser fusion located at the University of Rochester's Laboratory for Laser Energetics (UR/LLE). This facility was upgraded beginning in FY 1991 and began operating in the upgraded configuration in May 1995. During FY 1998, the facility began fielding weapons physics experiments (including classified). Omega will serve as the "bridge" facility between the shutdown of Nova and the startup of NIF.
- Z: a pulsed power machine used for inertial fusion research, located at Sandia National Laboratories (SNL). It has made many significant technological breakthroughs since it began operating as a z-pinch device in October 1996 and now conducts weapons physics and ignition related experiments.

- Trident: a smaller glass laser facility at Los Alamos National Laboratory (LANL) used for diagnostic testing and development, as well as weapons and basic physics experiments.

Performance Measures

- Continue construction of the National Ignition Facility according to its Project Execution Plan schedules.
- Conduct high energy density research on inertial confinement fusion facilities necessary to enhance understanding of areas of physics relevant to a better predictive assessment of nuclear weapons performance.

Significant Accomplishments

- Awarded all of the major physical construction contracts on the NIF. Construction well underway on the Optics Assembly Building, Target Area Building and Laser Building.
- By the end of FY 1998, completed nearly all of the Title II designs on special equipment items, and awarded contracts for support structures, laser auxiliary systems and target auxiliary systems.
- Zygo in Connecticut completed construction of their 25,000 square foot NIF optics manufacturing facility in February 1998 to be used for finishing NIF amplifier slabs and mirrors.
- Schott Glass Technologies in Pennsylvania completed construction of its NIF laser glass building, and Hoya in California completed a subscale melter demonstration for NIF laser glass in March 1998.
- Tinsley completed its 30,000 square foot facility for polishing NIF lenses and windows in Richmond, California in November 1998.
- On January 29, 1998, LLNL unveiled the world's largest KDP crystal. Grown in a record 6 weeks, it was 20 inches across, slightly less than 3 feet tall, and weighed 500 pounds. These fast growth crystals will be sliced into 1-cm thick plates to be used to change the color and switch the direction of the laser beams on NIF. 100 to 150 of these crystals are needed over the next five years for the NIF.
- Improved z-pinch dynamics on Saturn and Z have significantly enhanced total x-ray powers for stewardship missions -- achieved 2 MJ of x-ray energy and 290 TW of x-ray power on Z.
- Awarded 14 grants under the Inertial Fusion Science in Support of Stockpile Stewardship Program for unclassified innovative research in high-energy-density science.
- Initiated classified weapons physics experiments on the Omega facility at the University of Rochester to compensate for the shutdown of Nova in FY 1999.

ICF Funding by Laboratory

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Base ICF Program (excludes NIF)			
Lawrence Livermore National Laboratory	89,846	102,242	107,500
Los Alamos National Laboratory	21,896	21,940	23,000
Sandia National Laboratories	24,500	31,000	30,000
University of Rochester/Laboratory for Laser Energetics	26,299	28,800	30,450
Naval Research Laboratory	9,000	16,758	9,500
General Atomics	10,937	8,870	7,000
Headquarters	27	102	1,550
Oakland Operations Office	1,849	2,670	2,700
Total, Base ICF Program	184,354	212,382	211,700
National Ignition Facility			
National Ignition Facility - Other Project Costs	31,300	6,800	5,900
Construction (96-D-111)	197,800	284,200	248,100
Total, National Ignition Facility	229,100	291,000	254,000
Total, Inertial Confinement Fusion	413,454	503,382	465,700

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations & Maintenance					
Base ICF Program	184,354	212,382	211,700	-682	-0.3%
National Ignition Facility - Other Project Costs	31,300	6,800	5,900	-900	-13.2%
Total, Operations & Maintenance	215,654	219,182	217,600	-1,582	-0.7%
Construction - National Ignition Facility (96-D-111)	197,800	284,200	248,100	-36,100	-12.7%
Total, Inertial Confinement Fusion	413,454	503,382	465,700	-37,682	-7.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Base ICF Program			
Target Physics, Theory and Modeling			
Target physics experimental activities are supported to resolve target physics issues on both indirect and direct drive, including laser imprinting and hydrodynamic instability growth. Included are activities related to ignition, as well as weapons physics experiments on radiation flow, opacity, hydrodynamics, and material equation of state. In FY 2000, a major emphasis in this area will be the recruitment and training of operators for NIF. Approximately 60 operators will be trained at LLNL during FY 2000 for first bundle and laser bay 2 operations. This activity will also support the operations of the Optics Assembly Building where all of the NIF modules will be prepared for facility installation. Development of prototype ignition targets and minimal fabrication of initial NIF diagnostics will begin in FY 2000. The backlighter diagnostic for the Z facility at Sandia will be completed during FY 2000 which will enhance the experimental value of this facility for weapons physics science. NRL will continue experiments in FY 2000 to evaluate the potential for direct drive ignition on NIF. UR/LLE will address critical issues of direct-drive ICF physics in FY 2000, including work on "warm" physics and improvements in laser imprinting and Raleigh-Taylor growth-rate mitigation. A small amount of funding is included at HQ to support critical National Ignition Plan activities at currently undetermined sites. Allocation of funding among sites for this effort will be determined during execution of the FY 2000 budget	101,463	133,618	160,733
Target Development, Fabrication and Handling			
Research, development, fabrication and delivery of non-cryogenic and cryogenic targets are supported at all of the sites; however, cryogenic research and development at General Atomics is not directly supported in FY 2000	26,245	24,157	20,322

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Laser and Optics Technology Development			
Glass laser and optics component validation for NIF and Omega are supported. NIF optics pilot production, the culmination of the NIF laser and optics technology development effort, will be completed early in FY 2000	48,561	41,037	26,742
Advanced Driver Development			
Experimental activities on advanced pulsed-power accelerators, advanced glass laser concepts such as diode pumped solid state lasers, and advanced KrF driver concepts needed for the future (beyond NIF) have been supported in the past; however, given resource constraints, funding is not requested for this activity in FY 2000	5,398	9,750	0
Other ICF Activities			
Independent technical review of the ICF program (e.g. National Academy of Sciences), the National Laser Users Facility, and other user activities, including an individual investigator grant program in high energy density science relevant to ICF are supported	2,687	3,820	3,903
Total, Base ICF	184,354	212,382	211,700
National Ignition Facility			
National Ignition Facility - Other Project Costs			
The operations and maintenance funded activities that are directly related to the NIF, including research and development necessary to complete construction, conceptual design, NEPA documentation, and other project related costs are supported. Optics vendor facilitization will be completed during FY 2000	31,300	6,800	5,900
Construction (96-D-111)			
Provides the line item funding for the Total Estimated Cost (TEC) of the National Ignition Facility. FY 2000 funding represents the funding required to meet the approved schedule for NIF. During FY 2000, Switchyard 2, Laser Bay 2, and the Target Bay will be commissioned for installation of special equipment and the Target Chamber will be installed	197,800	284,200	248,100
Total, National Ignition Facility	229,100	291,000	254,000
Total, Inertial Confinement Fusion	413,454	503,382	465,700

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Base ICF Program	
Target Physics, Theory and Modeling	
■ Increase primarily due to the start of the transition from Nova operations to the ramp-up to NIF operations. Increase includes operations procedures preparation, operator training, operations support equipment, optics processing, and operations of the Optics Assembly Building. Funding will partially support the National Ignition Plan, minimal development of NIF target diagnostics and experimental equipment, but delays the initiation of the NIF cryogenic handling system until FY 2001. Funding is included to utilize Omega for 18 weeks of weapons physics experiments by scientists from LANL and LLNL, the same as the FY 1999 level of effort	+27,115
Target Development, Fabrication and Handling	
■ Decrease due to completion of the Omega cryogenic handling system and the elimination of direct support for General Atomics cryogenic research and development	-3,835
Laser and Optics Technology Development	
■ Decrease due to the completion of NIF optics pilot production	-14,295
Advanced Driver Development	
■ Decrease reflecting the need to allocate funds to the higher priority areas in support of NIF ignition	-9,750
Other ICF Support	
■ Minimal increase to adequately fund HQ support activities and independent investigator grants	+83
Total, Base ICF Program	-682
National Ignition Facility	
■ Decrease for NIF construction (-$36.1 million) and NIF Other Project Costs (-$.9 million) based on the approved funding profile for the project	-37,000
Total Funding Change, Inertial Confinement Fusion	-37,682

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	1,876	5,550	2,000	-3,550	-64.0%
Capital Equipment	9,856	9,900	10,000	100	1.0%
Total, Capital Operating Expenses	11,732	15,450	12,000	-3,450	-22.3%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
96-D-111 National Ignition Facility, LLNL	1,045,700	169,300	197,800	284,200	248,100	146,300
Total, Construction		169,300	197,800	284,200	248,100	146,300

Technology Partnerships and Education

Mission Supporting Goals and Objectives

The DP Technology Partnerships program builds cost-shared collaborative R&D partnerships between DP sites and industry. These partnerships were designed to directly support Stockpile Stewardship program objectives by enlisting the expertise and resources of U.S. industry. Defense Programs also provides funding for the Amarillo Plutonium Research Center and the Advanced Computational Technology Initiative (ACTI).

The Education program provides funding to utilize the unique resources of the Department of Energy -- people, programs, and facilities -- to improve science and math education throughout the Nation, while supporting the Defense Programs mission. Enhancing the scientific education of our citizens will ensure a highly trained, diverse scientific workforce for the laboratories and will enhance our ability to maintain the scientific and technical expertise necessary to conduct the Stockpile Stewardship mission. The projects, approved by Headquarters and conducted mainly by the Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories, ongoing in nature or for a defined period, are grouped in six major categories: student support, teacher/faculty enhancement, curriculum improvement, institutional improvement, educational technology and public understanding of science. Each laboratory publishes an annual report on the projects and their accomplishments. Historically Black Colleges and Universities and other minority institutions receive approximately 15 percent of this funding.

Beginning in FY 2000, the Education program will also include funding responsibility transferred from Weapons Program Direction for the Los Alamos County School District to support ongoing education enrichment activities, enhanced teacher salaries and the Northern New Mexico Educational Enrichment Foundation. In addition, funding is requested for the new National Atomic Museum to be located at the Balloon Park Museum in northern Albuquerque, New Mexico.

Performance Measures

- Establish strategic alliances and collaborations among the weapons laboratories, industries, and universities to enable effective use of scientific and technical personnel throughout the R&D community.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technology Partnerships	55,901	43,072	22,200	-20,872	-48.5%
Education	8,944	9,000	29,800	+20,800	231.1%
Total, Technology Partnerships and Education	64,845	52,072	52,000	-72	-0.1%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Technology Partnerships			
■ In FY 2000, the Technology Partnerships program will continue to work closely with the Advanced Manufacturing, Design and Production Technologies (ADaPT) initiative, Enhanced Surveillance Program, and the Stockpile Stewardship R&D program, though at a reduced level, to ensure partnership activities contribute significantly to the program goals and objectives and the overall DP mission. FY 2000 partnership activities will be focused mainly in two areas: 1) advanced manufacturing, including process technologies, advanced coatings, precision machining and inspection, casting, microelectronics, opto-electronics, forming and joining technologies, computer modeling and simulation robotics, and 2) development of current and potential key suppliers of components and tools (software and hardware), and equipment. Cost shared collaborations have proven the most beneficial, contributing significantly to DP weapons program objectives as well as U.S. competitiveness	35,239	28,072	8,200
■ Support for AMTEX will be discontinued in FY 2000	9,931	7,500	0
■ Support for the Amarillo Plutonium Research Center will be continued in this category (transferred from Weapons Stockpile Management) in FY 2000 with funding up to $5 million	0	0	5,000
■ Support for ACTI will be continued with funding up to $9 million in FY 2000	10,731	7,500	9,000
Total, Technology Partnerships	55,901	43,072	22,200

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Education			
■ Provide science and math education programs mainly at the three weapons laboratories, with approximately 15 percent of the funding at Historically Black Colleges and Universities and other minority institutions	8,944	9,000	10,300
■ Provide funding for the National Atomic Museum at the new Anderson Abruzzo International Balloon Park Museum (northern end of Albuquerque).	0	0	5,500
Prior to FY 2000, funding for the Los Alamos County School District was requested within Weapons Program Direction. In FY 2000, funding responsibility for these activities has been transferred from Weapons Program Direction in order to combine these activities with other ongoing education programs under the Stockpile Stewardship Education program:			
■ In FY 1998, the Department provided $8 million to the School District to support ongoing education enrichment activities and to support enhanced teacher salaries. In FY 1999, Congress appropriated $7 million for the School District; this budget requests up to $8 million for FY 2000	0	0	8,000
■ In FY 1998, the Department made the first payment, $3 million, to endow the Northern New Mexico Educational Enrichment Foundation. Per Congressional direction, the Department will provide $25 million to fully endow the Foundation by FY 2002. $3 million was appropriated in FY 1999 and this budget provides a minimum of $6 million for the Northern New Mexico Educational Enrichment Foundation in FY 2000	0	0	6,000
Total, Education	8,944	9,000	29,800
Total, Technology Partnerships and Education	64,845	52,072	52,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Technology Partnerships	
■ Funding for partnership activities decreases over 48 percent from FY 1999 appropriation. Many of the ongoing cooperative agreements which began to transition to closeout in FY 1999 will continue to close or may be absorbed within core stockpile stewardship efforts as appropriate	-19,872
■ Support for the American Textile Partnership (AMTEX) will be discontinued in FY 2000	-7,500
■ Support for the Amarillo Plutonium Research Center is transferred to this category from Weapons Stockpile Management in FY 2000	+5,000
■ Up to $9 million will support the Advanced Computational Technology Initiative (ACTI) which will be formulated to provide maximum benefit to weapons programs	+1,500
Total, Technology Partnerships	-20,872
Education	
■ The science and math education programs increases by $1.3 million from the FY 1999 appropriation.	+1,300
■ The Education program reflects the transfer of funding responsibility from the Weapons Program Direction decision unit to Stockpile Stewardship Education Programs for continued support for the Los Alamos County School District (up to $8 million) and the Northern New Mexico Educational Enrichment Foundation (a minimum of $6 million). In comparable terms, funding for the School District increases by $1 million from the FY 1999 level, and funding for the Foundation increases by $3 million over the FY 1999 level.	+14,000
■ Funding is requested for the new National Atomic Museum to be located at the Balloon Park Museum in northern Albuquerque, New Mexico.	+5,500
Total, Education	+20,800
Total Funding Change, Technology Partnerships and Education	-72

Stockpile Stewardship

Construction Project Data Sheets

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00-D-103, Terascale Simulation Facility, Lawrence Livermore National Laboratory, Livermore, California

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 2000	2Q 2001	4Q 2000	4Q 2004	83,500	86,200

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
2000	8,000	8,000	7,400
2001	20,000	20,000	19,000
2002	23,000	23,000	22,700
2003	23,000	23,000	23,000
2004	9,500	9,500	11,400

3. Project Description, Justification and Scope

Description

The project provides for the design, engineering and construction of the Terascale Simulation Facility (TSF) which will enable the very large-scale weapons simulations essential to ensuring the safety and reliability of the nuclear weapons stockpile. The building will contain a multi-story office tower with an adjacent computer center designed to house the 100 TeraOPS-class computers needed to meet the requirements of the Stockpile Stewardship Program. The TSF will bring together weapons code development teams to integrate experiments, material, physical, computer, and experimental sciences in support of the Stockpile Stewardship Program. The TSF will also help manage the networks and the "Assessment Theaters" necessary to store and understand the data generated by the most powerful computing systems in the world. The computer and simulation equipment are not funded by this project.

Justification

The Accelerated Strategic Computing Initiative (ASCI) has as its mission the acceleration of terascale simulation to meet the demands of the nation's nuclear defense mission. The challenge is to maintain confidence in the nuclear stockpile without underground nuclear testing. Along with sub-critical experiments, one of the primary tools employed will be three-dimensional (3-D) scientific weapons

calculations of unprecedented computational scope. As has been emphasized in the ASCI Program Plan, it is the rapid aging of both the stockpile and the designers with test experience that is at the heart of the issue and the reason for acceleration. The most critical period is between 2003 and 2010. By 2003, the number of designers with test experience will be reduced by about 50 percent from their numbers in 1990. By 2010 the percentage will be further reduced to about 15 percent. By 2003, most of the weapons in the stockpile will be in transition from their designed field life to beyond-field-life design. By 2010, about half will be in the beyond-field-life design stage. Therefore, some validated mechanism or capability must be available soon to certify the safety and reliability of this aging stockpile. A major element of this capability will be the ASCI applications codes and the associated terascale simulation environment. The ASCI program intends over the next six years to reach a threshold state simulation capability in which the first functional "full system calculation" generation of codes requiring a 100-plus TeraOPS computer will be used to certify the stockpile. The remaining designers and analysts with test experience will be an indispensable part of this process, because they will validate the models and simulation results.

The ASCI applications codes and the weapons analysts who make use of these applications require a supporting simulation infrastructure of major proportions, which includes:

- Terascale computing platforms (ASCI Platforms)
- A supporting numerical environment consisting of data management, data visualization and data delivery systems (Stockpile Computing Numerical Environment for Weapons Simulation (NEWS))
- Sophisticated computer science and numerical methods research and development teams (ASCI Problem Solving Environments (PSE) and Alliances)
- A first rate operations, user services and systems team
- Data assessment theaters plus high performance desktop visualization systems

To house, organize and manage these simulation systems and services requires a new facility with sufficient electrical power, mechanical support, networking infrastructure and space for computers and staff. The proposed Terascale Simulation Facility (TSF) at LLNL will meet these requirements.

Scope

The TSF project will construct a building (Building 453) of approximately 270,000 square feet located adjacent to an existing (but far less capable) computer facility, Building 451, on the LLNL main site. The building will contain a multi-story office tower with an adjacent computer center. The computer center will house computer machine rooms totaling approximately 47,500 square feet. The computer machine rooms will be clear span (without impediments) and of an aspect ratio designed to minimize the maximum distance between computing nodes and switch racks. The ceiling height will be sufficiently high to assure proper forced air circulation. A raised access floor will be provided in order to allow adequate room for air circulation, cabling, electrical, plumbing, and leak detection equipment.

The first computer structure will be available for occupancy in 2002. The building will be built with enough power and cooling to support two terascale systems. The first system will likely be installed in 2002. The computer center and electrical rooms will be designed so that power and cooling capacity can be shifted to areas requiring greater or lesser load. As a risk reduction strategy, the building will be further designed so that power and mechanical resources can be easily added in the event that systems

sited in the future will require higher levels of power. However, it is expected that after 2004, the rate of growth of the peak capability of installed computers will relax. Therefore, the building should have enough power and cooling to accept any system procured after 2004.

The TSF will include meeting rooms, offices, and a Data Assessment Theater for scientific visualization. The theater will be used both for prototyping advanced visualization concepts and for production. In short, the theater represents that area where physical and computer scientists working together will visualize and make accessible to the human eye and mind the huge data sets generated by the computers. This will allow workers to understand and assess the status of the immensely complex weapons systems being simulated.

The office space will accommodate staff and scientists who require access both to classified and unclassified workstations. Vendors, operational and problem solving environment staff must have immediate access to the computer system, since the simulation environment will require very active support. A key principle underlying all TSF planning is tight coupling between Stockpile Stewardship Program elements and the platforms. Thus, the TSF will also house the nucleus of the classified and unclassified (LabNet) networks. Additionally, space will be available to support a weapons code development team to integrate experimental, physical, material and computer sciences for support of Stockpile Stewardship requirements. To assure the efficient operation of remote Assessment Theaters, high-speed networking hubs will connect the computers seamlessly to key weapons scientists and analysts at the highest performance available.

Project Milestones

FY 2000:	Start design	2Q
	Physical construction start	4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $3,600)	4,715	0
Design Management Costs (0.6% of TEC)	530	0
Project Management Costs (0.6% of TEC)	530	0
Total Design Costs (6.9% of TEC)	5,775	0
Construction Phase		
Improvements to Land	1,700	0
Buildings	46,505	0
Utilities	10,400	0
Standard Equipment	1,255	0
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	2,940	0
Construction Management (3.2% of TEC)	2,655	0
Project Management (1.8% of TEC)	1,490	0
Total Construction Costs (80.2% of TEC)	66,945	0
Contingencies		
Design Phase (1.1% of TEC)	900	0
Construction Phase (11.8% of TEC)	9,880	0
Total Contingencies (12.9% of TEC)	10,780	0
Total, Line Item Costs (TEC) [a]	83,500	0

5. Method of Performance

Design shall be performed under a negotiated Best Value architect/engineer contract. Construction and procurement shall be accomplished by fixed-price contracts based on competitive bidding and best value.

[a] Escalation rates taken from the FY 2000 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	0	5,500	800	375	6,675
Construction	0	0	0	1,900	18,200	56,725	76,825
Total facility costs (Federal and Non-Federal)	0	0	0	7,400	19,000	57,100	83,500
Other project costs							
Conceptual design costs	0	500	800	0	0	0	1,300
NEPA documentation costs	0	0	150	0	0	0	150
Other project-related costs [b]	0	410	175	0	0	665	1,250
Total other project costs	0	910	1,125	0	0	665	2,700
Total Project Cost (TPC)	0	910	1,125	7,400	19,000	57,765	86,200

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs [c]	1,400	0
Programmatic operating expenses directly related to the facility [d]	53,100	0
Utility costs [e]	8,000	0
Total related annual costs (operating from FY 2004 through FY 2023)	62,500	0

[b] Including tasks such as Project Execution Plan, Pre-Title I Development, Design Criteria, Safeguards and Security Analysis, Architect/Engineer Selection, Value Engineering Study, Independent Cost Estimate, Energy Conservation Report, Fire Hazards Assessment, Site Surveys, Soil Reports, Permits, Administrative Support, Operations and Maintenance Support, ES&H Monitoring, Operations Testing, Energy Management Control System Support, Readiness Assessment.

[c] Facility operating costs are $1,400,000 per year (which also includes facility maintenance and repair costs), when facility is operational in 4th Qtr. FY 2004. Costs are based on the LLNL internal indirect rate Laboratory Facility Charge (LFC) for facility operating costs.

[d] The annual operating expenses for the Terascale Simulation Facility are estimated at $53,100,000 based on representative current operating expenses of 300 personnel. The majority of this funding is expected to come from DOE/DP for activities in support of the Nuclear Weapons Stockpile Stewardship Program.

[e] Costs are based on LLNL utility charges.

00-D-105, Strategic Computing Complex (SCC) Los Alamos National Laboratory, Los Alamos, New Mexico

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	1Q 2000	4Q 2000	1Q 2000	2Q 2002	100,000	106,800

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
2000	26,000	26,000	22,600
2001	56,000	56,000	59,374
2002	18,000	18,000	18,026

3. Project Description, Justification and Scope

Justification

Without nuclear testing, large-scale computations are the only means of predicting the safety, reliability, and yield of a nuclear weapon. The nuclear stockpile is aging. Generically, aging produces effects that introduce small three-dimensional defects which break the symmetries which designers have invoked in the past when designing nuclear weapons. We are also faced with the issue of the aging of the weapon scientists and engineers that were responsible for developing and testing the weapons in our stockpile. The new simulation models being developed for the stockpile can best be validated by these weapon scientists and engineers. Consequently, greatly enhanced computational requirements in both speed and memory are needed in the near future. It is estimated that assessing the safety and performance of the stockpile will require a factor of 100,000 increase in computational power over what has been required to design new weapons. The Accelerated Strategic Computing Initiative (ASCI), one of the highest priority programs within the Stockpile Stewardship Program, is designed to maintain the safety, reliability, and performance of the nuclear weapons in the stockpile, and is dedicated, and on track, to achieving this goal in less than a decade.

Numerical simulations are now the most important mechanism for the integration of the many complex processes which take place in a thermonuclear weapon. This means that the continued certification of the safety and reliability of the nation's nuclear stockpile relies to a greater extent on computer simulations. To respond to this challenge, the Strategic Computing Complex (SCC) at Los Alamos will

be capable of initially supporting a 50 TeraOPS computer platform and be capable of expanding to beyond 150 TeraOPS before 2010. To meet urgent national security requirements associated with nuclear weapons Stockpile Stewardship, this facility must be operational by the 2nd quarter of FY 2002. There is no other facility capable of housing and powering the ASCI supercomputer planned for the SCC.

The SCC and its associated information infrastructure—the high-speed networks, workstations, visualization centers, interactive data-analysis tools and collaborative laboratories—will support the Stockpile Stewardship Program and, potentially, other research efforts involving the simulation of complex phenomena of national importance. The SCC will enable the fulfillment of the prime stewardship mission to ensure the safety, reliability and performance of the Nation's nuclear weapons stockpile without underground nuclear testing. For example, it will be possible to simulate weapons safety scenarios at a multiscale level, beginning with the weapon in its transport container and going through detailed descriptions of components all the way down to the microstructure of the aged high-explosive material.

Description and Scope

The SCC will be a three-story structure with approximately 267,000 gross square feet which will house the world's largest and most capable computer (initially 30 TeraOPS, or 30 trillion floating point operations per second) in a specially designed 43,500-square-foot computer room. This room will be supported by electrical and mechanical rooms in excess of 60,000 square feet.

The facility will provide a dynamic environment for approximately 300 nuclear weapons designers, computer scientists, code developers, and university and industrial scientists and engineers to collaborate to extend the cutting edge of simulation and modeling development in support of nuclear weapons stockpile stewardship requirements. These scientists and engineers will work together, with support personnel, in simulation laboratories (approximately 200 in classified and 100 in unclassified areas). The facility will be located in Technical Area 3 (TA-3) at the Los Alamos National Laboratory.

The SCC features a visualization environment consisting of two immersive theaters, one in the classified area and one in the unclassified area. These theaters will have overhead projection and wrap-around features supporting the latest virtual-reality and visionarium environments. These theaters represent the highest-end capability available for data viewing analysis.

A powerwall theater in the secure environment will provide high-resolution interleaved displays that fill a wall with the latest projection technology. In addition to the powerwall display, this theater will contain conference capability, multiple display monitors, and electronic white-boards to promote effective teaming and collaborative discussions.

A third simulation environment promoting collaborations among teams is supplied by the areas designated as collaboratories. There are four of these areas, and they will contain conference space, a media-stack including laser-disc recorders for animation production and viewing, an immersadesk for compact virtual-reality (VR) analysis, multiple high-resolution graphics heads, electronic white-board, video teleconferencing tools, and electronic collaborative tools for effective interaction with researchers at open and secure sites. The collaboratory provides the users, code developers, and managers with an informal, information- and technology-rich environment with systems for simulation development,

collaboration, discussion, media-development, presentation, and problem analysis. The SCC will bring together weapons code development teams to integrate experiments, material, physical computer and experimental sciences in support of the Stockpile Stewardship Program.

An auditorium with seating for approximately 200 people will be provided to serve both classified and unclassified meetings. Conference rooms will be available in the classified and unclassified areas.

The proposed facility concept consists of a three-story structure that includes offices, simulation laboratories, collaboratories, a power wall, and a visualization theater. Site utilities directly related to this facility will be extended and upgraded as necessary.

The mechanical systems will be designed for maximum flexibility. The computer-room cooling system is planned to be adaptable for air-cooled computers, water-cooled computers, or a combination of both types. The simulation laboratory spaces are heated, cooled, and ventilated with modular, variable-volume air handling units, with separate air handling unit systems for classified and unclassified areas. Energy conservation is provided by the use of cooling-tower heat exchangers that are used to meet cooling requirements without running chillers during winter and cooler months.

The SCC facility will be fed by two different 13.8 kV underground power sources and is configured with double-ended switchgear and unit substations to allow switching for maintenance and isolation of faults. The proposed design consists of power conditioners, K-rated transformers, and distribution equipment rated for the high harmonics generated by the computer. The system is modular and expandable to allow growth and easy modification. A grounding ring surrounds the building in addition to a signal reference grid in the computer room to reduce electrical noise. A lightning protection system is incorporated into the facility. A fire detection system will be installed to monitor the entire building, as will a highly sensitive smoke detection system under the computer-raised floor. Communication lines will service the facility through an underground ductbank system utilizing fiber optic cable for both secure and open systems. Copper lines will be used for the voice communication system.

The facility infrastructure is designed to be scalable. At construction completion, the facility will have mechanical and electrical equipment installed to support up to 50 TeraOPS. As requirements go beyond the 50-TeraOPS capability, mechanical and electrical equipment can be added within the building in increments as required to support the computer technology at that time. This scalable feature of the SCC includes future installation of chillers, cooling towers, computer room air-conditioning units, substations, motor-generator power-conditioners, transformers, and panelboards. Scalability provides the Department of Energy (DOE) with a cost-effective option of not installing additional support equipment until it is needed and the ability to capitalize on technological advances in computing technology, as well as in the support equipment.

The computers and simulation equipment to be housed in the SCC are not funded as part of this project, they are funded as part of the ASCI Operations and Maintenance program.

Project Milestones:

FY 2000:	Start Design	1Q
	Start Construction	1Q [a]

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design, Drawings and Specifications - $3,458)	5,665	0
Design Management Costs (0.4% of TEC)	384	0
Project Management Costs (1.0% of TEC)	1,007	0
Total Design Costs (7.1% of TEC)	7,056	0
Construction Phase		
Improvements to Land	971	0
Buildings	56,255	0
Utilities	7,985	0
Standard Equipment	3,717	0
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	4,170	0
Construction Management (4.3% of TEC)	4,309	0
Project Management (1.5% of TEC)	1,508	0
Total Construction Costs (78.9% of TEC)	78,915	0
Contingencies		
Design Phase (1.5% of TEC)	1,501	0
Construction Phase (12.5% of TEC)	12,528	0
Total Contingencies (14.0% of TEC)	14,029	0
Total, Line Item Costs (TEC) [b]	100,000	0

5. Method of Performance

Design, construction, and procurement will be accomplished by a competitive best value fixed-price design-build contract. Design-build is a project delivery system where a single entity performs both the design and construction. Some advantages of design-build include a single source for construction activities, cost control and accountability.

[a] To meet the proposed completion of the computer room by January 2002, this project will be executed through a design-build contract. Design for grading and onsite utilities will begin in October 1999, physical construction on this aspect of the project will proceed at the end of December 1999, while design on the building continues.

[b] Escalation rates taken from the FY 2000 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	0	8,557	0	0	8,557
Construction	0	0	0	14,043	59,374	18,026	91,443
Total facility costs (Federal and Non-Federal)	0	0	0	22,600	59,374	18,026	100,000
Other project costs							
Conceptual design costs	0	959	1,526	0	0	0	2,485
NEPA documentation costs	0	68	87	44	45	41	285
Other ES&H Costs	0	85	71	11	11	59	237
Other project-related costs [c]	0	758	1,716	121	121	1,077	3,793
Total other project costs	0	1,870	3,400	176	177	1,177	6,800
Total Project Cost (TPC)	0	1,870	3,400	22,776	59,551	19,203	106,800

[c] Project Execution Plan, Pre-Title I Development, Design Criteria, Safeguards and Security Analysis, Design-Build Source Selection Committee work, Value Engineering Study, Independent Cost Estimate, Energy Conservation Report, Fire Hazards Assessment, Site Surveys, Soil Reports, Permits, Administrative Support, Operations and Maintenance Support, ES&H Monitoring, Operations Testing, Energy Management Control System Support, Readiness Assessment.

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs [d]	650	0
Facility maintenance and repair costs [e]	1,270	0
Programmatic operating expenses directly related to the facility [f]	55,000	0
Utility costs	6,600	0
Total related annual costs (operating from FY 2002 through FY 2021)	63,520	0

[d] When the facility is operational in the 2nd Quarter of FY 2002, costs will average $650,000 for labor and material per year. An average of 3.0 staff years will be required to operate the facility.

[e] Based on projected annual costs for LANL site services subcontractor as derived from historical maintenance and repair costs for the LDCC facility.

[f] Annual programmatic operating expenses are estimated at $55,000,000 based on representative operating expenses of 300 people. The majority of this funding is expected to come from DOE/DP for activities in support of the Nuclear Weapons Stockpile Stewardship Program.

00-D-107, Joint Computational Engineering Laboratory, Sandia National Laboratories, Albuquerque, New Mexico

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 2000	2Q 2001	3Q 2001	4Q 2003	28,870	30,303

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
2000	1,800	1,800	1,500
2001	6,700	6,700	3,261
2002	20,370	20,370	17,748
2003	0	0	6,361

3. Project Description, Justification and Scope

The Joint Computational Engineering Laboratory (JCEL) will be a new, state-of-the-art facility at Sandia National Laboratories for research, development, and application of leading-edge, high-end computational and communications technologies. JCEL will provide office space and laboratories for 175 people in a building with a total of approximately 55,200 gross square feet. JCEL will be the center of Sandia's computational modeling, analysis, and design community, and will be constructed in close proximity to Sandia's existing computer and communications building, presently occupied by part of this community.

JCEL's primary mission is to ensure the rapid development and application of high-end computing, modeling, analysis, and design needed to achieve the objectives of DOE's Stockpile Stewardship Program.

JCEL will utilize key expertise to create strategic simulations and advanced collaborative environments, and it will provide space for strategic partners from universities, DOE Laboratories, and the private sector to work together to integrate the technological expertise of government, universities, and industry. Increased interaction, collaboration, and teamwork are essential for shifting more rapidly to science-based methods and for effective stewardship of the nuclear stockpile. JCEL will provide classified and unclassified space in close proximity to facilitate collaboration between the users of high-end simulation technology and the developers, including research and development partners from universities and

industry, while maintaining strict security of classified weapon information. JCEL will also include space designed to encourage interaction and collaboration among the scientists and engineers occupying the building and will provide work space tailored for multidisciplinary, high-performance teams who will develop computer codes and analyze nuclear weapons.

JCEL will provide labs for developing, prototyping and using Virtual Environment Technology, where designers, analysts, and experimenters can interact with each other as if they were in the same room. Moreover, JCEL will use, as well as develop, this leading-edge technology. It will prototype and demonstrate a science and engineering workplace of the 21st century.

The communications networks will enable JCEL's occupants to use the supercomputers in the DOE complex. To display the extensive results of complicated, three-dimensional simulations of nuclear weapons, the JCEL project will also provide computer equipment for virtual reality and advanced visualization techniques, graphics workstations and printers, and video equipment.

To achieve its goals, the JCEL project will provide:

- A facility of approximately 55,200 gross square feet located immediately south of Building 880 in Technical Area I of Sandia National Laboratories on Kirtland Air Force Base in Albuquerque, New Mexico.
- Office space, laboratory space, management and administrative space, and interaction and meeting space.
- Access zones that include controlled, limited-access, and restricted areas.
- Classified and unclassified communications within the facility and between the facility and the rest of Sandia and DOE complex.
- Computer equipment for displaying and printing the results from complex, three-dimensional computer simulations of nuclear weapons.
- Computer workstations for use by engineers and scientists from other DOE labs, universities, and the private sector assigned temporarily to JCEL.
- Video equipment for video conferencing, displaying, and editing video images produced by computer simulations.

Benefits

- Reduced program costs through use of high-fidelity computer simulations developed through JCEL programs to reduce the scope of costly test programs.
- Faster response on stockpile stewardship issues that will arise.
- Rapid interchange of appropriate technology with the external community.
- Accelerated Defense Programs technology development.
- Cost savings in the development of Sandia research foundation technology base through in-kind contributions from industrial partners.

Project Scope

Plan, design, and construct a new, three-story building to accommodate a total of about 175 people, which will provide classified and unclassified space in close proximity. The project will provide computer equipment to: display three-dimensional simulations; support engineers and scientists from other DOE labs, universities, and the private sector, and provide video conferencing capability. Computer equipment includes: Interactive Multimedia equipment ($3,577,500); Virtual Reality/Advanced Visualization equipment ($1,192,500); high-end 3D graphic workstations and printers ($429,300); and design and analysis workstations ($477,000). In addition, the project will move existing furniture and install some new furniture. Site landscaping, parking, pedestrian access improvements, signage, and fencing improvements will be provided.

Project Milestones:

FY 2000: Start Design 2Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $802)	1,604	0
Design Management Costs (0.7% of TEC)	213	0
Project Management Costs (0.6% of TEC)	178	0
Total Design Costs (6.9% of TEC)	1,995	0
Construction Phase		
Improvements to Land	1,056	0
Buildings	12,076	0
Utilities	719	0
Standard Equipment	2,431	0
Major Computer Items	5,676	0
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	895	0
Construction Management (1.6% of TEC)	463	0
Project Management (0.9% of TEC)	255	0
Total Construction Costs (81.6% of TEC)	23,571	0
Contingencies		
Design Phase (0.9% of TEC)	263	0
Construction Phase (10.5% of TEC)	3,041	0
Total Contingencies (11.5% of TEC)	3,304	0
Total, Line Item Costs (TEC) [a]	28,870	0

[a] Escalation rates taken from the FY 2000 DOE escalation multiplier tables.

5. Method of Performance

Architectural and engineering design and inspection will be performed by Sandia Facilities Departments and/or under a competitive-bid fixed-price contract based on capability and capacity to perform the work. Construction will be performed under a competitive-bid fixed-price contract or multiple competitive-bid fixed-price contracts.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	0	1,500	758	0	2,258
Construction	0	0	0	0	2,503	24,109	26,612
Total facility costs (Federal and Non-Federal)	0	0	0	1,500	3,261	24,109	28,870
Other project costs							
Conceptual design cost [b]	989	0	0	0	0	0	989
Other project-related costs [c]	0	159	100	58	35	92	444
Total other project costs	989	159	100	58	35	92	1,433
Total Project Cost (TPC)	989	159	100	1,558	3,296	24,201	30,303

[b] Includes NEPA documentation costs.

[c] Including tasks such as Project Execution Plan, Pre-Title I Development, Design Criteria, Safeguards and Security Analysis, Architect/Engineer Selection, Value Engineering Study, Independent Cost Estimate, Energy Conservation Report, Fire Hazards Assessment, Site Surveys, Soils Reports, Permits, Administrative Support, Operations and Maintenance Support, ES&H Monitoring, Operations Testing, Energy Management Control System Support, Readiness Assessment.

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–30 years)		
Facility operating costs [d]	259	0
Facility maintenance and repair costs [e]	118	0
Programmatic operating expenses directly related to the facility [f]	51,000	0
Utility costs	196	0
Total related annual costs (operating from FY 2003 through FY 2032)	51,573	0

[d] When all facilities are operational in the 4th Quarter of FY 2003, average $258,840 for labor and materials per year. An average of 3.4 staff years will be required to operate the facility.

[e] A total of 1.0 staff years per year are required to maintain the facility.

[f] Annual programmatic operating expenses are estimated at $51,000,000, based on representative current operating expenses of 175 people. The majority of this funding is expected to come from DOE/DP for activities in support of the Nuclear Weapons Stockpile Stewardship Program. Lesser amounts are expected from other sources for activities which are mutually beneficial to the funding source and DOE/DP. By bringing these activities together in one building, we expect the effectiveness of this work to be increased by at least 10% and probably much more. This would correspond to a savings of at least $5 million per year of DOE/DP operating funds.

99-D-102, Rehabilitation of the Maintenance Facility, Lawrence Livermore National Laboratory, Livermore, California

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	4Q 1999	4Q 1999	3Q 2000	7,900	8,100
FY 2000 Budget Request *(Current Baseline Estimate)*	4Q 1999	2Q 2000	3Q 2000	2Q 2001	7,900	8,100

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	4,000	4,000	458
2000	3,900	3,900	6,031
2001	0	0	1,411

3. Project Description, Justification and Scope

Building 511 is the mission-critical center of all facility maintenance activity at the Lawrence Livermore National Laboratory (LLNL). In addition to being the center for general facilities maintenance, repair activities, and minor facilities modifications for all facilities at LLNL, the activities conducted in Building 511 include custom manufacture of items essential to experiments conducted in support of the Stockpile Stewardship and Management program and other programs at the lab.

Building 511 is a shop facility that is nearly 60 years old. It will be upgraded and remodeled to make it functional and serviceable for at least the next 20 years, while assuring life safety and operational requirements within the facility. New exterior finish system and window casements will provide a weather-tight building skin. Fire protection and electrical systems will be upgraded as required by code. Rest room facilities will be modified to reflect workplace diversity and to comply with accessibility standards. Entries to the facility will be upgraded for people and for material handling access and egress.

Specifically, this project will accomplish the following:

- Remove and dispose of asbestos siding (28,000 square feet) and install new exterior insulation finishing systems on all exterior faces of the building.
- Replace existing window units and glass (approximately 9,000 square feet).
- Upgrade all existing rest rooms.
- Update fire protection systems including fire exiting requirements, and replace existing fire sprinkler system.
- Replace code deficient and obsolete electrical panels, upgrade electrical receptacles, switches, and grounding.
- Modify building entry to accommodate easy passage of people and material.
- Install an elevator to facilitate movement of people and material to the second floor.

Project Milestones:

FY 1999: Start Design	4Q
FY 2000: Complete Design	2Q
Start Construction	3Q
Complete construction	4Q

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	800	800
Design Management Costs (0.1% of TEC)	8	0
Project Management Costs (2.6% of TEC)	207	215
Total Design Costs (12.8% of TEC)	1,015	1,015
Construction Phase		
Buildings	4,000	4,000
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	634	634
Construction Management (5.4% of TEC)	424	424
Project Management (5.7% of TEC)	452	452
Total Construction Costs (69.8% of TEC)	5,510	5,510
Contingencies		
Design Phase (2.8% of TEC)	220	220
Construction Phase (14.6% of TEC)	1,155	1,155
Total Contingencies (17.4% of TEC)	1,375	1,375
Total, Line Item Costs (TEC) [a] [b]	7,900	7,900

5. Method of Performance

Design will be performed by LLNL Plant Engineering. Major equipment requiring long lead time will be purchased by LLNL early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Activation will be performed by LLNL forces.

[a] Escalation rates taken from the FY 1999 DOE escalation multiplier tables.

[b] Current estimate based on Conceptual Design Report of March 1997.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	458	777	0	0	1,235
Construction	0	0	0	5,254	1,411	0	6,665
Total facility costs (Federal and Non-Federal)	0	0	458	6,031	1,411	0	7,900
Other project costs							
Conceptual design cost	100	0	0	0	0	0	100
NEPA documentation costs	0	15	0	0	0	0	15
Other project-related costs	50	35	0	0	0	0	85
Total other project costs	150	50	0	0	0	0	200
Total Project Cost (TPC)	150	50	458	6,031	1,411	0	8,100

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs [c]	557	557
Total related annual costs (operating from FY 2001 through FY 2019)	557	557

[c] Facility operating costs are estimated to be $557,000 per year. Costs are based on utility charges and the LLNL internal indirect rate Laboratory Facility Charge for facility operating costs. An average of approximately 6 FTE staff years will be required to operate the facility per year.

99-D-103, Isotope Sciences Facilities, Lawrence Livermore National Laboratory, Livermore, California

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.
- The Total Estimated Cost decreased from $19,400,000 to $17,400,000 and the Total Project Costs decreased from $19,800,000 to $17,700,000 as a result of the following scope reductions:
  - The poor condition of 29 exhaust systems required their replacement using operating expense funds prior to the initiation of this project.
  - Three HVAC systems in B154 were upgraded by an FY 1998 General Plant Project to satisfy an immediate need for additional laboratory space.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	4Q 1999	2Q 2000	2Q 2002	19,400	19,800
FY 2000 Budget Request *(Current Baseline Estimate)*	4Q 1999	1Q 2003 [a]	2Q 2000	2Q 2004	17,400	17,700

[a] Project design and construction components are organized into separate phases with construction on individual phases proceeding upon completion of the design for that phase.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	2,000	2,000	100
2000	2,000	2,000	3,700
2001	5,000	5,000	4,500
2002	4,400	4,400	4,400
2003	4,000	4,000	4,000
2004	0	0	700

3. Project Description, Justification and Scope

This project provides for a major rehabilitation of the nuclear chemistry facilities at Lawrence Livermore National Laboratory to extend the life of these essential program facilities. The principle objective of the project is to enhance the radio chemistry research, analytical, and characterization services provided to Defense Programs activities at LLNL. These facilities also support critical analytical waste characterization and programmatic environmental monitoring activities as well.

This project provides for a seismic retrofit and construction of an office addition to the Isotope Science Facility (Building 151), retrofit of Building 151/Building 154 ventilation systems, decontamination of the Refractory Materials Facility (Building 241) and disposal of four existing trailers. The current nuclear chemistry building (B-151) is a 31-year old wet-chemistry research building in need of a major rehabilitation to extend its life in support of the Weapons Stockpile Stewardship Program. The seismic rating of Building 151 does not meet current code requirements. This project will provide the seismic modifications necessary to meet current code requirements for performing isotopic research and support the ongoing mission.

- The Building 151 Office Addition is approximately 22,000 square feet contiguous to B-151. It resolves long standing co-location and program operating efficiency issues in a cost effective package. Exterior treatment will be selected consistent with the existing building, with access provided directly from Building 151 at both floor levels. The addition will contain offices, conference and meeting rooms, elevator, rest rooms, programmatic storage, and various support facilities.
- The existing Building 151 HVAC system is inefficient, difficult to maintain, and does not meet current requirements for exhaust and control. The majority of mechanical work entails taking approximately 51 fume-hood exhaust systems and manifolding them into four new systems. Two air handling units will be converted from constant-volume to variable-air-volume systems with variable-frequency drives. Building 154 is underutilized due to the difficulties in balancing the three air-pressure zones as required by researchers. To fully utilize this building for wet-chemistry laboratory use, the existing HVAC system, retention tank system, utilities, and fire-protection system must be

upgraded. The HVAC work done under the FY 1998 General Plant Project corrected some of the HVAC system problems, but not all. In addition, approximately 11 new fume hoods with associated exhaust ductwork, fans, and controls will be provided. B-151 and B-154 HVAC modifications and fume hood replacements will rehabilitate these high downtime and high maintenance subsystems and extend life to meet the current mission. Some safety and operational benefits also result.

- After moves are completed from Building 241, it will be characterized and decontaminated for future use by Defense Programs at LLNL. Four office trailers will be demolished or excessed to complete the moves. Consolidation of operations from B-241 and personnel from four older trailers complete the efficiency and cost-driven elements, which though minor in cost, have substantial operational benefits.

Along with the seismic retrofit and HVAC system/fume hood replacement, the project encompasses program consolidation for increased efficiency of operations, indirect cost savings, and safety of operations benefits. These are reflected respectively in the B-151 Addition, the B-154 HVAC modifications, and program moves from B-241 and trailers (T-1326, T-1527, T-1927, and T-2425).

Project Milestones:

FY 1999:	Start Title I Design	4Q
FY 2000:	Complete Title I Design	3Q
	Start Title II Design	3Q
	Start Construction	2Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications -$1,080)	1,350	1,615
Design Management Costs (0.1% of TEC)	20	35
Project Management Costs (0.4% of TEC)	80	80
Total Design Costs (8.3% of TEC)	1,450	1,730
Construction Phase		
Improvements to Land	275	0
Buildings	6,875	10,720
Utilities	155	0
Standard Equipment	940	0
Removal Cost Less Salvage	2,160	170
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	785	930
Construction Management (6.3% of TEC)	1,100	1,370
Project Management (2.9% of TEC)	505	990
Total Construction Costs (73.5% of TEC)	12,795	14,180
Contingencies		
Design Phase (1.4% of TEC)	235	260
Construction Phase (16.8% of TEC)	2,920	3,230
Total Contingencies (18.2% of TEC)	3,155	3,490
Total, Line Item Costs (TEC) [b]	17,400	19,400

The Current Estimate is based on the Conceptual Design Report of March 1997 and the supplement dated April 1998.

5. Method of Performance

Contracting arrangements are as follows: Design will be performed by A-E and LLNL forces. Major equipment requiring long lead time will be purchased by LLNL early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Activation will be performed by LLNL forces.

[b] Escalation rates taken from the FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	100	750	590	245	1,685
Construction	0	0	0	2,950	3,910	8,855	15,715
Total facility costs (Federal and Non-Federal)	0	0	100	3,700	4,500	9,100	17,400
Other project costs							
Conceptual design cost	150	0	0	0	0	0	150
NEPA documentation costs	0	25	0	0	0	0	25
Other project-related costs	0	75	0	0	0	50	125
Total other project costs	150	100	0	0	0	50	300
Total Project Cost (TPC)	150	100	100	3,700	4,500	9,150	17,700

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs	740	704
Total related annual costs (operating from FY 2004 through FY 2023)	740	704

99-D-104, Protection of Real Property (Roof Reconstruction—Phase II), Lawrence Livermore National Laboratory, Livermore, California

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	1Q 2000	3Q 1999 [a]	4Q 2001	19,900	19,930
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	2Q 2003	4Q 1999 [b]	4Q 2003	19,900	19,970

[a] Design and construction was planned as three separate packages (Package 1: 4 buildings; Package 2: 3 buildings; Package 3: 4 buildings). Construction on Package 1 will begin while design of Package 2 is still ongoing.

[b] Design and construction will now be handled as five separate packages (Package 1: 2 buildings; Package 2: 2 buildings; Package 3: 1 building; Package 4: 2 buildings; Package 5: 4 buildings). Construction on each package will begin upon completion of the design for that package, while design continues on the remaining packages.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	2,500	2,500	1,608
2000	2,400	2,400	3,176
2001	2,800	2,800	2,689
2002	2,800	2,800	2,900
2003	9,400	9,400	7,836
2004	0	0	1,691

3. Project Description, Justification and Scope

This project is the second of three phases of the LLNL roof replacement program. The first Phase is funded under 96-D-102. Phase II addresses 11 Weapons Stockpile Stewardship and Management Program buildings which require complete roofing system replacement along with the replacement of associated roof mounted equipment and piping systems which have deteriorated beyond economical repair. This is required in order to maintain and protect the integrity of the facilities and to assure that programmatic work can proceed without the risk of serious damage to the buildings or the programmatic efforts contained within. Work includes buildings: B111, B113, B121, B141, B194, B231, B241, B251, B281, B321 and B332. In all cases, the roofing systems have exceeded their 20 year design life by 11 to 23 years. The same holds true for most of the roof mounted equipment and piping systems as they are original equipment, again with an average design life of 20 years. Both the roofing and mechanical systems have deteriorated to the point where normal repair is no longer a viable alternative.

The 11 roofs in this project are experiencing severe deterioration problems including membrane failure, and the associated roof mounted mechanical equipment is also showing high levels of unreliable operation which adversely effect the support to the programmatic effort. As stated, normal maintenance procedures no longer are effective to maintain weather integrity of the roofing systems, to the point that leaks in the roofing system are jeopardizing experiments, experimental data and equipment. The impact from not replacing the roofing and mechanical equipment systems will result in excessive maintenance and repairs costs. In addition, the adverse programmatic impact could cost the Lab and Defense Programs significant dollars in lost production.

Operating expense budgets fund maintenance at a level of required repair, but not at the level required to replace roofs and roof mounted mechanical equipment. Since these 11 buildings are required to support critical Weapons Stockpile Stewardship and Management Program missions, capital funding is requested for the replacement of the roofs and associated roof mounted mechanical equipment.

Project Milestones:

FY 1999: Package No. 1 (Buildings 111 and 194)	
Start Design	3Q
Complete Design	4Q
Start Construction	4Q
FY 2000: Complete Construction Package No. 1	1Q
Package No. 2 (Buildings 332, 251, and 121)	
Start Design	1Q
Complete Design	2Q
Start Construction	3Q
Complete Construction	4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $640)	770	770
Design Management Costs (0.1% of TEC)	29	29
Project Management Costs (0.3% of TEC)	50	50
Total Design Costs (4.3% of TEC)	849	849
Construction Phase		
Other Structures	9,000	9,000
Standard Equipment	3,810	3,810
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	2,183	2,183
Construction Management (2.2% of TEC)	444	444
Project Management (4.2% of TEC)	844	844
Total Construction Costs (81.8% of TEC)	16,281	16,281
Contingencies		
Design Phase (1.0% of TEC)	207	207
Construction Phase (12.9% of TEC)	2,563	2,563
Total Contingencies (13.9% of TEC)	2,770	2,770
Total, Line Item Costs (TEC) [c]	19,900	19,900

[c] Escalation rates taken from FY 1999 DOE escalation multiplier tables. Current estimate based on Conceptual Design Report of March 1997.

5. Method of Performance

The Laboratory proposes a new approach to the implementation of this project. The new approach includes obtaining the services of a roofing specialist to develop construction contractor specifications and perform construction management and inspection. The construction contract is planned to be a unit price based contract with standard construction details. Change order processing and negotiations will be greatly simplified. This new approach should greatly reduce the cost of engineering and design. Minor architect-engineer work and activation will be performed by LLNL forces.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	100	262	466	228	1,056
Construction	0	0	1,508	2,914	2,223	12,199	18,844
Total facility costs (Federal and Non-Federal)	0	0	1,608	3,176	2,689	12,427	19,900
Other project costs							
Conceptual design costs	30	0	0	0	0	0	30
Other project-related costs	0	40	0	0	0	0	40
Total other project costs	30	40	0	0	0	0	70
Total Project Cost (TPC)	30	40	1,608	3,176	2,689	12,427	19,970

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–20 years)		
Total related annual costs (operating from FY 2003 through FY 2022)	0	0

99-D-105, Central Health Physics Calibration Facility, Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	3Q 1999	1Q 2000	1Q 2001	3,900	4,200
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	2Q 2000	2Q 2000	2Q 2001	3,900	4,200

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	2,900	2,900	1,197
2000	1,000	1,000	2,203
2001	0	0	500

3. Project Description, Justification and Scope

The purpose of this project is to consolidate all of the existing health physics calibration functions at LANL in one location. The location will be remote from the general public due to the radiation present when calibrating instruments. The facility will allow calibration of radiation protection instruments to the required levels for: x-rays, beta and alpha contamination, gamma-rays, tritium, and neutrons.

The equipment and sources currently used for the radiation detector calibrations are over 30 years old in almost all cases. Source drive mechanisms have exceeded their useful lives. If an equipment failure or a source rupture occurs (due to old age), the mission of the Laboratory could be severely compromised. Without appropriate health physics instruments in place, facilities could be shut down because of the possibility of compromised worker radiation protection.

The current facilities are scattered among three areas: the Calibration Building, TA-3-130; and the upper floor and two basement areas of the Physics Building, TA-3-40. A number of Physics Division personnel are located in the same building and close to the ESH-4 Calibration Laboratory at TA-3-40. Operations at the Calibration Laboratory can cause low level radiation exposures to these personnel. These exposures are not As-Low-As-Reasonably Achievable (ALARA). The operators of the existing calibration equipment are also subject to radiation fields due to the configuration of the radiation sources. These exposures would be eliminated with operations moved to a refurbished facility.

The LANL Radiation Instrument Calibration (RIC) function is a very important institutional program. Approximately 8,000 instruments are maintained, repaired, and calibrated each year. These include portable and fixed alpha/beta contamination monitors, exposure rate meters, tritium-in-air monitors, continuous air monitors, and stack effluent monitors. Effluent monitor results are reported to the Environmental Protection Agency (EPA). The calibrations performed have a significant link to the radiation worker health and safety.

This newly renovated facility will allow the calibration functions to meet the requirements of 10 CFR 835, Occupational Radiation Protection; DOE Order 5480.4 - Environmental protection, Safety and Health Protection, which requires compliance with ANSI N323 - Radiation Protection Instrument Test and Calibration, and ANSI N42.17 - Performance Specifications for Health Physics Instrumentation, and will enable the laboratory to close a Tiger Team Category II finding.

The site selected, TA-36 Building 1, is currently occupied by a group performing administrative functions and very low level radiation experiments. The current occupants would be moved to another location. The TA-36 site is remote from the densely populated areas of the Laboratory, is served by paved roads, and is located in a secure area. The building (approximately 100,000 square feet) will be renovated, additional shielding installed for the calibration function, and renovated for all functions associated with radiological calibration. One smaller structure will be constructed at TA-36 by the project. The structure, Building 214, will be approximately 2,380 square feet and will house two free in air calibration functions that require high bay facilities. This building will be a concrete structure due to shielding requirements. The remote, refurbished site would eliminate the problems outlined above. The calibrations would be performed using state-of-the-art equipment, minimizing the probability of failure and the consequent threat to the Laboratory mission. The operator exposure would be eliminated as well. The ALARA concerns would no longer be an issue.

Project Milestones:

FY 1999:	Start Design	3Q
FY 2000:	Complete Design	2Q
	Start Construction	2Q

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	208	208
Design Management Costs (0.5% of TEC)	20	20
Project Management Costs (0.3% of TEC)	10	10
Total Design Costs (6.1% of TEC)	238	238
Construction Phase		
Improvements to Land	55	55
Buildings	1,310	1,310
Special Equipment	1,225	1,225
Standard Equipment	210	210
Removal Costs Less Salvage	70	70
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	42	42
Construction Management (1.5% of TEC)	58	58
Project Management (0.8% of TEC)	32	32
Total Construction Costs (77 0% of TEC)	3,002	3,002
Contingencies		
Design Phase (2.3% of TEC)	90	90
Construction Phase (14.6% of TEC)	570	570
Total Contingencies (16.9% of TEC)	660	660
Total, Line Item Cost (TEC) [a]	3,900	3,900

5. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer fixed-price contract. Construction of the project will be accomplished by a fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

[a] Escalation rates taken from the FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project costs							
Facility costs							
Design	0	0	197	131	0	0	328
Construction	0	0	1,000	2,072	500	0	3,572
Total facility costs (Federal and Non-Federal)	0	0	1,197	2,203	500	0	3,900
Other project costs							
Conceptual design costs	100	30	0	0	0	0	130
NEPA documentation costs	20	40	0	0	0	0	60
Other project-related costs	30	30	30	20	0	0	110
Total other project costs	150	100	30	20	0	0	300
Total project cost (TPC)	150	100	1,227	2,223	500	0	4,200

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--30 years)		
Facility Operating Costs	30	30
Facility Maintenance and Repair Costs	20	20
Utility Costs	12	12
Total related annual costs (operating from FY 2001 through FY 2030)	62	62

99-D-106, Model Validation and Systems Certification Center, Sandia National Laboratories, Albuquerque, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	2Q 2000	3Q 2000	4Q 2001	18,219	19,111
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	4Q 2000	3Q 2000	4Q 2002	18,230	19,122

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	1,600	1,600	720
2000	6,500	6,500	6,064
2001	5,200	5,200	5,927
2002	4,930	4,930	5,519

3. Project Description, Justification and Scope

The Department of Energy (DOE) has the statutory and mission responsibility for the design, production, maintenance, retirement and dismantlement of the United States nuclear weapons. In support of this mission, Defense Programs is responsible for the engineering development of the nonnuclear components and the overall systems engineering and integration for all nuclear weapons, including the

integration of nuclear weapons with their delivery vehicles. Responsibilities also include assuring that weapons' military characteristics (MCs) and Stockpile-to-Target-Sequence (STS) requirements are met for hostile, normal, and abnormal environments.

Pertinent, reliable, and timely information is key to fulfilling these responsibilities, and in part, this information is obtained through laboratory testing and corresponding analysis. Testing is performed in five primary areas in support of nonnuclear components and systems:

- Development testing (testing to certify design intent)
- Experimentation to validate and certify analytical models
- Product certification (such as neutron generators and AT 400 containers)
- Surveillance testing, which sometimes includes investigative testing
- Testing to support dismantlement.

Confidence in certifying the stockpile has been and will continue to be contingent upon high-quality, reliable, and pertinent data and competent analysis of that data, although the approach to obtain and analyze data and the nature of the data will change in response to DOE stockpile stewardship challenges.

The Model Validation and Systems Certification Center (MVSCTC) Project will provide a modern communications infrastructure coupled with a common control/operations facility for Sandia's eleven full-scale environmental test capabilities located in Tech Area III. The concept design of the MVSCTC reflects an optimized operational system composed of three subsystems including: Communications Infrastructure, Command and Control, and facilities to accommodate related operational functions.

The MVSCTC Project will implement an operational system that allows for both remote and local control of each of the test capabilities. This system will allow for more effective and efficient management of test operations and provide flexibility in meeting programmatic and specific customer needs. The Command and Control Center (CCC) will provide the remote control; Mobile Interface Units (MIUs) will provide local data acquisition and command and control as well as connection to the communications infrastructure at the individual test capabilities.

The MVSCTC communications infrastructure will be comprised of a communications hub (the CCC) and supporting infrastructure (communications media from the CCC to each of the test sites) that will link Sandia's environmental test capabilities to other Sandia personnel involved in modeling, simulation, design and related activities. Additionally, the infrastructure will link the MVSCTC into the nuclear weapons complex (NWC) electronic information network. The communications infrastructure will consist of high-capacity cabling installed in an underground concrete-encased ductbank of conduits. The capacity and robust nature of this infrastructure protection assures not only the viability of the communications infrastructure over the long run but also allows advances in communications technology to be easily incorporated over the life of the system.

Two MIUs, which are self-contained mobile trailers that house the equipment necessary to control the test capabilities and collect data from them, will be used for local control of test capability and to interface the communications system to nine of the eleven test capabilities. (Two test capabilities have unique programmatic needs that require connection to the communications system at all times.) Shared use of these two MIUs to support nine test facilities standardizes and reduces the equipment that is

otherwise required at each of the test facilities. The MIUs are being built as part of Sandia's Modernization Program; only the purchase and installation of the pertinent communications infrastructure termination equipment to be placed in the MIU as part of the MVSCTC is included in this capital project request.

Facilities to Accommodate Related Operational Functions

The scope of the proposed project will include the rehabilitation of two existing buildings, Buildings 6584 and 6587. A small addition will be constructed on the southwest corner of Building 6584 to accommodate a new entry ramp and lobby for the Command and Control Center. Included in the scope is 15,200 square feet of Building 6584 (circa 1950) and 4,700 square feet in the west end of Building 6587 (circa 1950). Existing occupants will be relocated to accommodate the MVSCTC.

Special Facilities

Communications Infrastructure

The communications infrastructure is the overall system of fiber-optic and copper lines and related infrastructure elements. To provide needed communications capacities, an unspliced 72 fiber cable will be installed from the CCC to each test capability. Use of unspliced runs assures longevity of the infrastructure and maximum information transmission capacity.

In addition to the fiber-optic cable, copper lines consisting of 30 pairs of telephone cable and 15 pairs of individually-shielded instrumentation cable will be installed. The telephone cable provides 24-hour service to each test capability for telephone, fire, and intrusion systems.

All fiber-optic and copper lines will be installed in a PVC ductbank, placed in a trench and encased in concrete. The depth of the concrete encased ductbank will be 30-inches below grade. Associated manholes and/or junction boxes will be locked.

The proposed communications infrastructure is located primarily within Sandia's Tech Area III. However, the main fiber optic trunk, which is to be installed from the existing Tech Control Center (TCC) in the Technology Support Center (TSC, Building 6585) to the MVSCTC, extends beyond the Tech Area III borders. The TSC is located just outside Tech Areas III and V, approximately 400 linear feet from the MVSCTC common control facility in Building 6584. The Tech Control Center (TCC) in the TSC will provide the point of physical connection into existing telecommunications infrastructure.

Planned connection to the existing copper telephone infrastructure will occur at a location close to the TSC (specifically, Building 6585A containing an optical remote) or at an additional trunk breakout location near the Centrifuge Facility, Building 6526. The actual connection point will depend on modifications that Sandia is presently making to the telephone infrastructure.

Command/Control System

The command and control system includes all the electronic systems required to manage the communications systems, interface the information systems to the test capabilities and allow operators, engineers, and customers to control capability functions and observe and record operations. Electronic equipment required to perform these functions includes: digital network and

video switching and transmission hardware; computer systems; video display and recording systems; and hardcopy peripherals. The majority of this equipment will be located in the CCC. Hardware required for the communications network completion at the test site or in the MIUs is also included in the MVSCTC Project scope.

Project Milestones:

FY 1999:	Start Design	3Q
FY 2000:	Complete Design	4Q
	Start Construction	3Q

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications -$691)	938	938
Design Management Costs (1.3% of TEC)	238	238
Project Management Costs (0.7% of TEC)	122	122
Total Design Costs (7.1% of TEC)	1,298	1,298
Construction Phase		
Improvements to Land	227	227
Buildings	2,907	2,907
Special Equipment	8,586	8,586
Standard Equipment	1,473	1,473
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	422	422
Construction Management (2.1% of TEC)	381	381
Project Management (0.8% of TEC)	154	154
Total Construction Costs (77.6% of TEC)	14,150	14,150
Contingencies		
Design Phase (1.2% of TEC)	213	213
Construction Phase (14.1% of TEC)	2,569	2,558
Total Contingencies (15.3% of TEC)	2,782	2,771
Total, Line Item Costs (TEC) [a]	18,230	18,219

5. Method of Performance

This work will be accomplished using a Sandia administered fixed-price, incentive, design-build contract.

[a] Escalation rates taken from the FY 1999 DOE escalation multiplier tables. Current estimate based on Conceptual Design Report dated March 12, 1997.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project costs							
Facility costs							
Design	0	0	720	564	227	0	1,511
Construction	0	0	0	5,500	5,700	5,519	16,719
Total facility costs (Federal and Non-Federal)	0	0	720	6,064	5,927	5,519	18,230
Other project costs							
Conceptual design costs	306	0	0	0	0	0	306
NEPA documentation costs	20	0	0	0	0	0	20
Other ES&H costs	0	0	6	14	14	14	48
Other project-related costs	10	72	106	98	110	122	518
Total other project costs	336	72	112	112	124	136	892
Total Project Cost (TPC)	336	72	832	6,176	6,051	5,655	19,122

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated useful life of each facility—40 years)		
Facility operating costs [b]	141	141
Facility maintenance and repair costs [c]	818	818
Programmatic operating expenses directly related to the facility [d]	5,733	5,733
Capital equipment not related to construction but related to the programmatic effort in the facility	235	235
Utility costs	77	77
Total related annual costs (operating from FY 2002 through FY 2041)	7,004	7,004

[b] Facility operating costs will average $127,000 for labor and $14,000 for materials per year. An average of 1.7 staff years will be required to operate all facilities. The facility does not replace any other facility.

[c] Maintenance and repair costs for all facilities average $348,000 for labor and $470,000 for materials. A total of 5 staff years per year is required to maintain all facilities.

[d] Estimate reflects annual programmatic operating expenses associated with the operations and maintenance of the eleven test capabilities that are to be connected through the communications infrastructure to the common command and control facility implemented by the MVSCTC. Estimate includes: all loaded labor associated with direct test activities as well as preventative maintenance; facility costs (space charges, direct purchases, service contracts, etc.) and associated overhead loads. Estimate also includes projected, annualized operating expenditures incurred to maintain, repair, or replace-in-kind the existing equipment in these test capabilities.

99-D-108, Renovate Existing Roadways, Nevada Test Site

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Public Law 105–245, the Energy and Water Development Appropriations Act for FY 1999, provided only $15,000,000 of the $25,300,000 requested for new Stockpile Stewardship construction projects, and required independent assessments to validate cost and schedule before initiation of the projects. The independent assessments are targeted to start in the beginning of February with transmission to Congress in early April. Project milestones and funding profiles for this project are consistent with the schedule for completion of the assessments and the Department's implementation of the $10,300,000 FY 1999 funding reduction.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	4Q 1999	1Q 2000	1Q 2001	11,005	11,128
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	1Q 2000	2Q 2000	1Q 2001	11,005	11,128

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	2,000	2,000	1,021
2000	7,005	7,005	6,002
2001	2,000	2,000	3,982

3. Project Description, Justification and Scope

This project will provide for the renovation of 37.0 miles of Mercury Highway from the southern boundary of the Nevada Test Site (NTS) to the intersection of Rainier Mesa Road to Area 3. These repairs will consist of removing existing debris from pavement cracks, filling cracks with asphalt sealant, installing a stress absorbing membrane, and applying a new asphaltic-concrete overlay. In addition, the 2.3 miles of the Rainier Mesa Road from the intersection of Mercury Highway to the

intersection of road 4-04 in Area 4 will be reconstructed. Repairs will consist of total reconstruction of the roadbed and the application of the asphalt pavement.

The renovated road will have two-inch-thick overlay; the reconstructed road will have three-inch-thick paving. Aggregate shoulders will parallel each side. All required traffic signs, striping, and markers will be included in this project. No buildings or utilities are included in this project.

Mercury Highway is the primary access highway for any activity at the NTS, including subcritical experiments and future missions. This all-weather, paved, asphaltic-concrete road has been in service for almost 40 years. All personnel, heavy equipment, and supplies entering and/or exiting the NTS depend upon this access route. The pavement surface has severely deteriorated because of age, ground motion from underground nuclear events, and heavy truck traffic. Trucks frequently carry loads that far exceed normal highway limits, i.e., H-20 highway wheel-loading. Standard remedial measures, such as crack-filling or chip-and-seal overlays, will do little to extend the road's service life. The proposed extensive renovation will both eliminate the pavement distress as well extend the road's service life.

The Rainier Mesa Road is the only access road to the ongoing Big Explosive Experiment Facility (BEEF) in Area 4. This road is now extensively damaged. Total reconstruction of this road is required to continue use as a viable access road in support of the BEEF program.

Project Milestones:

FY 1999:	Start Design	3Q
FY 2000:	Complete Design	1Q
	Start Construction	2Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	1,332	1,332
Design Management Costs (0.7% of TEC)	85	85
Project Management Costs (1.7% of TEC)	189	189
Total Design Costs (14.6% of TEC)	1,606	1,606
Construction Phase		
Improvements to Land	6,924	6,924
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	72	72
Construction Management (4.9% of TEC)	534	534
Project Management (2.5% of TEC)	270	270
Total Construction Costs (70.9% of TEC)	7,800	7,800
Contingencies		
Design Phase (2.5% of TEC)	273	273
Construction Phase (12.0% of TEC)	1,326	1,326
Total Contingencies (14.5% of TEC)	1,599	1,599
Total, Line Item Cost (TEC) [a]	11,005	11,005

5. Method of Performance

Design will be performed by the performance-based management contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding. Inspection, contract administration, surveying, and related project functions will be accomplished by the performance-based management contractor.

[a] Escalation rates taken from the FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project costs							
Facility costs							
Design	0	0	1,021	828	30	0	1,879
Construction	0	0	0	5,174	3,952	0	9,126
Total facility costs (Federal and Non-Federal)	0	0	1,021	6,002	3,982	0	11,005
Other project costs							
Conceptual design costs	92	0	0	0	0	0	92
NEPA documentation costs	26	0	0	0	0	0	26
Other project-related costs	5	0	0	0	0	0	5
Total other project costs	123	0	0	0	0	0	123
Total project cost (TPC)	123	0	1,021	6,002	3,982	0	11,128

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–35 years)		
Total related annual costs (operating from FY 2001 through FY 2035)	0	0

97-D-102, Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT), Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1988 Budget Request	1Q 1988	N/A [a]	4Q 1988	4Q 1990	30,000	N/A [b]
FY 1989 Budget Request	3Q 1988	N/A [a]	4Q 1988	4Q 1990	53,400	N/A [b]
FY 1990 Budget Request	3Q 1988	N/A [a]	4Q 1988	4Q 1992	53,400	N/A [b]
FY 1991 Budget Request	3Q 1988	N/A [a]	2Q 1989	4Q 1992	53,400	N/A [b]
FY 1992 Budget Request	3Q 1988	1Q 1995	2Q 1989	4Q 1994	53,400	N/A [c]
FY 1993 Budget Request	3Q 1988	1Q 1995	2Q 1989	4Q 1994	53,400	N/A [c]
FY 1994 Budget Request	3Q 1988	1Q 1995	2Q 1989	3Q 1997	81,400	85,600
FY 1995 Budget Request	3Q 1988	4Q 1995	2Q 1989	3Q 1997	81,400	85,600
FY 1996 Budget Request	3Q 1988	4Q 1995	2Q 1989	3Q 1998	81,400	85,600
FY 1997 Budget Request	3Q 1988	4Q 1995	3Q 1989	1Q 1999	105,700	114,760
FY 1998 Budget Request	3Q 1988	4Q 1995	3Q 1989	1Q 1999	186,700	199,210
FY 1999 Budget Request	3Q 1988	4Q 2000	3Q 1989	4Q 2002	259,700	269,800
FY 2000 Budget Request *(Current Baseline Estimate)* [d]	3Q 1988	4Q 2000	3Q 1989	4Q 2002	259,700	269,800

[a] There was no requirement for A-E duration or completion date dunng these fiscal years and, therefore, this information is not available.

[b] There was no requirement for TPC during these fiscal years and, therefore, this information is not available

[c] During these fiscal years, the project was delayed while completing the Accelerator Development Plan in order to verify plans and budgets and, therefore, this information is not available.

[d] Due to the complicated history of this project as described in Section 3, and the fact that it has two distinct phases, it is not possible to identify the specific year for Preliminary Estimate and Title I Baseline.

2. Financial Schedule [e]

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1988	1,800	1,800	201
1989	9,700	9,700	2,912
1990	10,905 [f]	10,905	10,767
1991	5,000 [g]	5,000	7,558
1992	0	0	5,139
1993	3,500 [h]	3,500	2,643
1994	17,000	17,000	5,881
1995	17,000	3,000	6,159
1996	16,495	19,495	5,045
1997	0	11,000	23,873
1998	46,300 [i]	46,300	37,681
1999	36,000	36,000	47,809
2000	61,000	61,000	59,341
2001	35,000	35,000	32,106
2002	0	0	12,585

3. Project Description, Justification and Scope

The Dual-Axis Radiographic Hydrotest Facility (DARHT) project was previously a subproject of the Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase II project (88-D-106). With the virtual completion of the remaining ten subprojects in 88-D-106, the DARHT effort was established as a stand-alone project in FY 1997 so that it can be more readily managed, monitored and funded.

Justification

Since its inception in 1988, the DARHT project has been recognized as a key link in DOE efforts to maintain the quality and reliability of the nuclear weapons stockpile. Historically, radiographic hydrodynamic tests and dynamic experiments have been a requirement to support the DOE (and

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[e] Funds appropriated in FY 1988-1996 are from the DARHT subproject 88-D-106 and were moved to 97-D-102 to support management and monitoring of the project.

[f] Reflects an appropriation of $15,760,000 and the subsequent sequestration of $4,855,000 for FY 1990 and the FY 1990 Omnibus reprogramming approved by appropriations subcommittees.

[g] Reflects an appropriation of $16,800,000 and the subsequent FY 1991 Omnibus reprogramming of $11,800,000 approved by Congressional subcommittee

[h] No funds were appropriated in FY 1993. Reflects reprogramming of $3,500,000 redirected from prior year appropriation from Dormitones subproject of Line Item 88-D-106 at the Nevada Test Site (NTS).

[i] FY 1998 funding represents $24,300,000 for completion of Phase 1 (first-axis) and $22,000,000 for engineering planning and long-lead procurement for Phase 2.

predecessor agencies) mission; they remain an important requirement for future efforts of the Stockpile Stewardship and Management (SS&M) Program as they assist in the understanding and evaluation of nuclear weapon performance. Dynamic experiments are used to gain information on the physical properties and dynamic behavior of materials used in nuclear weapons, including changes due to aging. Hydrodynamic tests are used to obtain diagnostic information on the behavior of a nuclear weapons primary (using simulated materials for the fissile materials in an actual weapon) and to evaluate the effects of aging on the nuclear weapons remaining in the greatly reduced stockpile. The information that comes from these types of tests and experiments cannot be obtained in any other way.

The DOE existing capability to obtain diagnostic information was designed and implemented at a time when the organization could rely on direct observations of the results of underground nuclear tests to provide definitive answers to questions regarding nuclear weapons performance. Without the ability to verify weapons performance through nuclear tests, the remaining diagnostic tools are inadequate by themselves to provide sufficient information. Accordingly, as the Nation moves away from nuclear testing, DOE must enhance its capability to use other tools to predict weapons safety, performance, and reliability. In particular, DOE must enhance its capability to perform hydrodynamic experiments to assess the condition and behavior of nuclear weapons primaries.

Although the current U.S. stockpile is considered to be safe and reliable, the existing weapons are aging beyond their initial design lifetimes and, by the turn of the century, the average age of the stockpile will be older than at any time in the past. To ensure continued confidence in the safety and reliability of the U.S. nuclear weapons stockpile, DOE needs to improve its radiographic hydrodynamic testing capability as soon as possible. Uncertainty in the behavior of the aging weapons in the enduring stockpile will continue to increase with the passage of time because existing testing techniques, by themselves, are not adequate to assess the safety, performance, and reliability of the weapons primaries. Should DOE need to repair or replace any age-affected components, retrofit existing weapons, or apply new technologies to existing weapons, existing techniques are not adequate to assure weapons safety and reliability. In an era without nuclear testing, DOE believes that it is probable that the existing weapons will require these types of repairs or retrofits in the foreseeable future. DOE has determined that no other currently available advanced techniques exist that could provide a level of information regarding nuclear weapons primaries comparable to that which could be obtained from enhanced radiographic hydrodynamic testing.

In addition to weapons work, DOE uses its radiographic testing facilities to support many other science missions, and needs to maintain or improve its radiographic testing capability for this purpose: Hydrodynamic tests and dynamic experiments are important tools for evaluating conventional munitions; for studying hydrodynamics, materials physics, and high-speed impact phenomena; and for assessing and developing techniques for disabling weapons produced by outside interests.

Project History Leading to Current Project Scope

Originally, the project scope included two 16-MeV electron-beam accelerators producing x-rays. In FY 1990, the Department decided to defer construction of the Hydrotest Firing Site (HFS) pending completion of technology development verified by the test results from an Integrated Test Stand (ITS), which consisted of about 30 percent of one x-ray machine. Following the successful ITS test results, development and construction of the hydrotest firing site was re-scoped based on the recommendations of two independent "Blue Ribbon" review committees assembled to assist the Department of Energy

(DOE) in enhancing the development of a vital hydrotest capability. The new scope provided for the development, procurement, and installation of the first of two 16-MeV flash x-ray machines (for dual-axis radiography) at the firing site; and construction of a weatherproof building to house the dual-axis radiographic systems and supporting calibration activities. Construction was resumed in FY 1994.

On January 26, 1995, an injunction was issued for this project by the United States District Court for the District of New Mexico, requiring a cessation of all actions associated with the DARHT construction project, including any construction, procurement, design, or any furtherance of the DARHT project pending completion and judicial review of an Environmental Impact Statement (EIS) and Record of Decision (ROD). In response, the Department ceased all project activities and completed an EIS for the project. A ROD was published in October 1995. The preferred option that was selected was to complete the project and operate the DARHT facility with the use of steel containment vessels to minimize the environmental impacts from operation of the facility. This containment option includes multiple phases to eventually obtain at least 75 percent reduction in the emissions from high-explosives testing when compared to the DARHT Baseline Alternative analyzed in the EIS. The January 1995 injunction was lifted in April 1996 and DARHT construction resumed in May 1996.

The DARHT project is now redefined to comply with the ROD preferred alternative and is divided into two phases. The first phase, most of which has been in progress since FY 1988, consists of the construction of a Radiographic Support Laboratory (RSL) and a Hydrotest Firing Site (HFS), which includes the first of two flash x-ray machines. In addition, this phase includes: the initial stage of containment of emissions from the high-explosives experiments to be conducted at the facility; an increase in accelerator energy from 16 to 20 MeV; changes in the accelerator to generate higher electron-beam currents; and improved diagnostics. Phase 1 will be completed during FY 1999 and the first axis will become operational by June 1999. Phase 2 will include the second flash x-ray machine, as well as the second stage of increased containment of testing emissions. The Department's decision in September 1997 of the Long-Pulse Induction Accelerator as the best technology for the second axis resulted in the current baseline for the project. A third phase of increased containment of testing emissions as defined in the ROD will be evaluated after several years of operating experience on DARHT. If a decision is made at the time to develop a vessel system capable of containing a 400 pounds of TNT equivalent high explosives, a new line item would be proposed.

Phase 1

Phase 1 provides for the construction of the Radiographic Support Laboratory, which is completed; development, procurement, and installation of the first of two flash x-ray machines (for dual-axis radiography) at the firing site; procurement and installation of state-of-the-art hydrodiagnostic instrumentation at the firing site; construction of a blastproof building to house the dual-axis radiographic systems and support calibration activities; and, the first containment vessel (an existing vessel design modified for DARHT testing).

Hydrotest Firing Site (HFS)

The entire HFS building is being constructed as part of this phase, as well as the first x-ray machine and all electronic and optical diagnostics. The second machine, necessary to complete the essential dual-axis configuration of the facility, will be built in a sequential manner (Phase 2), allowing it to take advantage of engineering and scientific advances that occur before its construction. The first machine is a state-of-the-art linear induction accelerator, producing an electron beam of approximately 20-MeV that will be

converted into an x-ray beam. A high speed electronic data acquisition system, a firing site control system, and optical imaging systems will also be included. Optical instrumentation includes high-speed framing and streak cameras and laser velocity interferometers. To improve the diagnostics capability of this facility, a gamma-ray camera is included.

The HFS building is a two-level, 39,650-square-foot building to house and operate both accelerators. The walls and roof are designed to shield personnel operating the facility from the radiation produced by the accelerators, as well as to resist blast forces resulting from the detonation of explosives. The accelerators will be located on a three foot thick concrete slab on grade. Both accelerator rooms contain a total of approximately 13,175 square feet and are equipped with a 10-ton capacity bridge crane. Completion of the entire building for both x-ray machines allows installation of the second machine (Phase 2) to take place without stopping hydrodynamic testing activities that would begin upon installation of the first machine.

The power supply rooms provide space adjacent to the accelerators for electrical equipment that serves the accelerators. These rooms are equipped with 3-ton capacity bridge cranes. The detection chamber is electromagnetically shielded. Adjacent to the detection chamber are the control room, a cable room, a capacitor discharge unit (CDU) room, and a computer room. The detection chamber, computer room and accelerator control room are also provided with an access flooring system. Other rooms include an optical room, an analyzer room, a Fabry Perot room, a laser illumination room, an assembly room, toilets, and mechanical/electrical equipment room. This area contains approximately 26,475 square feet.

Fire protection is provided throughout by a hydraulically designed foam/water automatic sprinkler system. Plumbing and process piping includes hot and chilled circulating water, potable hot and cold water, industrial cool water, sanitary sewer, compressed air, natural gas, transformer oil, and low-conductivity water systems. A boiler and two chillers are included to provide hot and cold water. This conditioned water is used for heating, ventilating, and air-conditioning the building, with the exception of the detection chamber and accelerator control room, which are serviced with "computer-type" units. Two above-ground, 12,000 gallon oil storage tanks, a cooling tower, and an electrical substation are provided. Power is supplied to the building from an existing 13.2 kV line. The building is equipped with communication systems that include telephone, intercom, and broad band communications.

Site work includes a new asphalt surfaced access road, an asphalt surfaced circulation road and parking area, surface drainage, and erosion control. Utilities extended to the site include natural gas, water, electrical power, and communication services. A septic tank and seepage pit are provided to handle the sanitary sewage.

For Phase 1, a prototype vessel system and a temporary cleanout unit are being fabricated to obtain the initial 5 percent reduction in testing emissions when compared to the DARHT Baseline Alternative analyzed in the EIS for the first five-year period of facility operation. The prototype vessel system will be a modification of an existing steel vessel design for experiments containing up to 27 kg of high-explosives.

Phase 2

Included in DARHT Phase 2 is the second electron beam accelerator which will be installed in the second accelerator hall provided in Phase 1. The second machine, necessary to complete the essential dual-axis configuration of the facility, is being built in a sequential manner, allowing it to take advantage of engineering and scientific advances that have occurred since construction of the first machine. In September 1997, the Department selected the Long-Pulse Linear Induction Accelerator because it presented the greatest technological advancement for the lowest cost and least risk. The second machine will be capable of providing four high-quality beam pulses over four microseconds with each pulse comparable in quality to the single pulse machine in the first axis.

The technology selected for Phase 2 requires a machine that is longer than the accelerator hall currently under construction. To accommodate the longer machine, it was necessary to increase the size of the west accelerator hall by 1,300 square feet. Other modifications that were required to the HFS included a larger roof hatch to install equipment, extension of the 3-foot thick accelerator foundation and glycol system modifications. While the HFS was constructed as part of Phase 1, the changes were driven by Phase 2 requirements and were, therefore, budgeted for in Phase 2.

A preparation facility includes high bay space for cleanout, process, and two staging areas. The high bay spaces will include bridge cranes. This facility includes a small analytical lab, change rooms, storage, waste storage, fabrication shop, a small multipurpose room, an area for office cubicles, and the mechanical/electrical support spaces.

Fire protection for the vessel preparation facility will be provided throughout by a hydraulically designed automatic sprinkler system. Areas with the potential for contamination will drain to a 25,000 gallon above-ground storage tank to provide secondary containment of the sprinkler water. The areas with the potential for contamination will also be connected to a mitigating debris recycling system. Other plumbing systems will be potable hot and cold water, hot and cold circulating water, a double wall drain line for potentially contaminated water, and sanitary waste drainage. A natural gas-fired boiler will provide the hot water and a chiller will provide the chilled water. The HVAC system will include a HEPA filtration system to vent the vessels. The areas with potential contamination will be designed for seven air changes per hour with a once-through air handling system. The analytical lab will be equipped with a fume hood. The building will be equipped with communication systems that will include telephone, intercom, and broad-bank communications.

Site work for the vessel preparation facility will include a new asphalt surfaced access road, a large asphalt paved circulation and parking area. The circulation area will be designed for the large vessel handling equipment and storage. There will also be approximately 2,000 square feet of covered storage. Utilities extended to the site will include natural gas, water, sanitary sewer, electrical power, and communication services. Power will be supplied to the building from an existing 13.2-kV line.

This phase includes a vessel capable of containing a detonation of 124 pounds of TNT equivalent high explosives and a vessel capable of confining a detonation of 44 pounds of TNT equivalent high explosives. This results in a reduction in testing emissions of at least 40 percent, when compared to the DARHT Baseline Alternative analyzed in the EIS, during the second 5-year period of facility operation. Containment goals will be met or exceeded through the use of a combination of techniques: containment, material replacement, post-shot recovery, and program management.

Experience gained during Phases 1 and 2 will allow the final containment techniques to be implemented that would result in at least 75 percent reduction in testing emissions when compared to the DARHT Baseline Alternative analyzed in the EIS for the remaining years of facility operation. The Department of Energy will meet the release reduction goals of this phase through the use of the combination of techniques discussed above.

Project Milestones:

FY 1999:	Phase 1:	HFS Construction Complete	3Q
		First Axis Machine Operational	3Q
		Complete First Axis Readiness Assessment	3Q
	Phase 2:	Deliver Accelerator Cells to LANL for Prototype Testing with the Beam	4Q
FY 2000:	Phase 1:	Complete	
	Phase 2:	Complete Second Axis Machine Accelerator Hardware Design	1Q
		Complete Confinement Vessel Design	2Q
		Complete Design for Vessel Preparation Facility	4Q

4. Details of Cost Estimate*

(dollars in thousands)

Phase 1	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	23,959	23,959
Total Design Costs (22.7% of TEC)	23,959	23,959
Construction Phase		
Buildings	23,814	23,814
Special Equipment	46,804	46,804
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	2,032	2,032
Project Management (6.1% of TEC)[j]	6,439	6,439
Total Construction Costs (74.8% of TEC)	79,089	79,089
Contingencies		
Construction Phase (2.5% of TEC)	2,652	2,652
Total Contingencies (2.5% of TEC)	2,652	2,652
Total, Line Item Costs (TEC)	105,700	105,700

*Note: The Details of Cost Estimate section has been split between Phase 1 and Phase 2 to more accurately reflect costs under the categories required for the FY 2000 budget. It is not possible to identify all costs in the new categories since this project was established and tracked using cost categories in effect at the time of initial funding in FY 1988.

[j] Since the project was initially funded in FY 1988, all of the Phase 1 management effort has been tracked only as project management; consequently, all design and construction management is included as project management under the construction phase.

4. Details of Cost Estimate

(continued)

	(dollars in thousands)	
	Current Estimate	Previous Estimate
Phase 2		
Design Phase		
Preliminary and Final Design Costs (Design Drawings and Specifications)	17,337	17,337
Design Management Costs (0.2% of TEC) [k]	273	273
Project Management Costs (0.2% of TEC) [k]	382	382
Total Design Costs (11.7% of TEC)	17,992	17,992
Construction Phase		
Buildings	9,370	9,370
Special Equipment	101,103	101,593
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	336	336
Construction Management (0.4% of TEC) [k]	637	637
Project Management (5.7% of TEC) [k]	8,832	8,832
Total Construction Costs (78.1% of TEC)	120,278	120,768
Contingencies		
Design Phase (1.9% of TEC)	2,902	2,902
Construction Phase (8.3% of TEC)	12,828	12,338
Total Contingencies (10.2% of TEC)	15,730	15,240
Total, Line Item Costs (TEC) [l] (Phase 2)	154,000	154,000
Total, Line Item Costs (TEC) (Phase 1)	105,700	105,700
Total, Line Item Costs (Phase 1 and Phase 2)	259,700	259,700

5. Method of Performance

Design and procurement of the conventional facilities were performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

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[k] Design and construction management only includes conventional facility design and construction. Design phase project management includes only conventional facility design phase management. Construction Phase project management includes both the conventional facility construction phase management and all of the special equipment project management. Special equipment does not have a traditional construction component with design, procurement and installation taking place concurrently among the various special equipment work elements. Attempting to separately track and report special equipment design and construction management would require establishing an additional 26 WBS elements and associated cost control elements. This is deemed to have greater cost than benefit. The intent to establish conventional facility construction design and construction management costs is supported, however, in this approach..

[l] Escalation rates taken from FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years*	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	20,239	10,004	6,568	3,999	2,039	2,004	44,853
Construction	49,939	27,677	41,241	55,342	30,067	10,581	214,847
Operating expense funded equipment	1,105	0	0	0	0	0	1,105
Total facility costs (Federal and Non-Federal)	71,283	37,681	47,809	59,341	32,106	12,585	260,805
Other project costs							
R&D necessary to complete construction	1,471	0	0	0	0	0	1,471
Conceptual design cost	260	0	0	0	0	0	260
NEPA documentation costs	2,960	0	0	0	0	0	2,960
Other project-related costs [m]	2,795	8	461	0	0	1,040	4,304
Total other project costs	7,486	8	461	0	0	1,040	8,995
Total Project Cost (TPC)	78,769	37,689	48,270	59,341	32,106	13,625	269,800

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--30 years)		
Facility operating costs [n]	10,400	10,400
Programmatic operating expenses directly related to the facility [o]	8,000	8,000
Total related annual costs (operating from FY 2002 through FY 2031)	18,400	18,400

[m] These are the costs for (1) FY 1997 Technology Options Study to evaluate the alternative technologies for the second x-ray machine, (2) facility start-up including the Readiness Assessment, and (3) management of operating expense items.

[n] These are all direct and indirect costs associated with maintaining the facility readiness for programmatic purposes. It includes facility maintenance, utility costs, space tax, organizational support, janitorial services, and security with both axes operational and in the final containment phase. It includes the RSL, HFS, and Vessel Preparation Facility. On average, the related effort is 28.5 FTEs.

[o] The annual programmatic operating expense will fluctuate significantly from year to year depending on the programmatic effort. The $8,000,000 is an average based on the FY 1997 effort at PHERMEX.

96-D-102, Nuclear Weapons Stockpile Stewardship Facilities Revitalization, Phase VI, Various Locations

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical *line* [|] in the left mar gin.)

Significant Changes

- Reduced FY 1999 funding for new Stockpile Stewardship construction projects, and the resulting impacts to FY 2000 and outyear funding profiles, have required reprioritization of outyear Stockpile Stewardship funding requirements. As a result, the funding profile for the Storm Drain, Sanitary Sewer, and Domestic Water subproject at Sandia National Laboratories has been adjusted. By the end of FY 2000, the project will complete the Sanitary Sewers, Water System Meters and Controls, and the 9th Street Storm Drain System. No funding will be requested in FY 2001, and when funding resumes in FY 2002, the project will start and complete Water Systems Rehabilitation and complete the remainder of the Storm Drain portion of this subproject.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request [a]	1Q 1996	1Q 1999	3Q 1997	4Q 1999	33,700	34,660 [a]
FY 1997 Budget Request	1Q 1996	4Q 1999	3Q 1997	1Q 2002	69,659	70,748
FY 1998 Budget Request	1Q 1996	4Q 1999	3Q 1997	1Q 2002	72,876	75,475
FY 1999 Budget Request	1Q 1996	4Q 1999	3Q 1997	4Q 2000	74,226	76,254
FY 2000 Budget Request *(Current Baseline Estimate)*	1Q 1996	3Q 2002	3Q 1997	4Q 2003	74,226	76,298

[a] The TEC/TPC for this project in FY 1996 includes only two subprojects. Additional subprojects were included in the FY 1997 (two) and FY 1998 (two) Construction Project Data Sheets bringing the total number of subprojects funded within this line item to six.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1996	2,520	2,520	340
1997	19,250	19,250	3,744
1998	19,810	19,810	21,470
1999	24,106 [b]	24,106	28,679
2000	2,640	2,640	12,802
2001	0 [b]	0	1,291
2002	2,900	2,900	1,900
2003	3,000	3,000	4,000

3. Project Description, Justification and Scope

This series of projects provides for the construction of new facilities, and modifications, relocations, and additions to existing facilities for the Nuclear Weapons Stockpile Stewardship facilities at Sandia National Laboratories (SNL), Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL) and the Nevada Test Site (NTS). These projects are a multiyear capital investment program to revitalize the Nuclear Weapons Stockpile Stewardship complex. These facilities will replace or add to existing facilities and infrastructure that are overaged, deteriorated, overcrowded, or are inadequate to preserve capabilities required for the current and future weapons stockpile stewardship program.

The Nuclear Weapons Stockpile Stewardship program is made up of a highly complex set of activities which are extremely dependent on current and advanced technology facilities and equipment to meet its varied needs. The successful performance of the Stockpile Stewardship program contributes directly to the quality and reliability of the nuclear weapons stockpile. In addition to unremitting requirements for reliability and performance, we are committed to pursue new safety and safeguards features for the enduring stockpile. These standards require innovative physics concepts and designs, the development of new materials and material applications, and extension of both engineering and manufacturing technologies beyond the current "state-of-the-art." All of this requires support of a reliable infrastructure.

The revitalization effort was initiated in FY 1984 with Project 84-D-107, Nuclear Testing Facilities Revitalization, and was followed in FY 1985, FY 1988, FY 1990, FY 1992 and FY 1994 by follow-on phases. These projects were defined based on needs identified by representatives from the Albuquerque and Nevada Operations Offices, and the three weapons laboratories. Since the initiation of these

[b] A reprogramming action that received final Congressional approval on November 5, 1998, increased FY 1999 funding for the 138 kV Substation Modernization subproject by $3,683,000 and eliminated the corresponding FY 2001 funding requirement.

projects, all aspects of the laboratory complex capital asset base continued to be critically reviewed and have resulted in the initiation of this line item project which contains six subprojects.

The consolidation of the Nuclear Weapons Stockpile Stewardship revitalization needs into one project data sheet focuses the issue of the total needs of the Stockpile Stewardship program. With the decreased demand for new weapon systems, this project is oriented toward preserving the critically needed infrastructure at LANL, NTS, SNL, and LLNL. These subprojects all cover general purpose facilities at various DOE locations that are an integral part of the installation support infrastructure. Included are basic utility systems, such as electrical power distribution, sewage, roads, parking lots, gas distribution, water supply, and the like. Many of these systems were constructed during the 1940s to World War II specifications with a 10-year maximum life expectancy. Despite extensive preventative maintenance over the intervening years, many of them are now deteriorated beyond economic repair and do not meet present-day standards for safety and environmental protection.

Full funding for subprojects 01, Water Well Replacements; 02, Fire Protection Improvements; 04, Roof Replacement; and 06, Site 300 Fire Station/Medical Facility has been provided through prior year appropriations.

Details for subprojects 03, 138 kV Substation Modernization; and 05, Storm Drain, Sanitary Sewer, and Domestic Water Systems, Modernization, which require funding in FY 2000 are provided.

Subproject 01 - Water Well Replacements, LANL, Los Alamos, New Mexico

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$16,800	$11,200	$ 4,500	$ 1,100	$ 0	$ 0	$ 0	3Q 1997 - 4Q 1999

This project received its final funding in FY 1999. No additional funding is required.

Project Milestones:

FY 1999:	Complete Construction for Phase B	3Q
	Complete Construction for Phase C	4Q
FY 2000:	Start of Operations	2Q

Subproject 02 - Fire Protection Improvements, LANL, Los Alamos, New Mexico

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$16,900	$ 6,570	$ 5,450	$ 4,880	$ 0	$ 0	$ 0	4Q 1997 - 4Q 1999

This project received its final funding in FY 1999. No additional funding is required.

Project Milestones:

FY 1999: Complete Construction	4Q
FY 2000: Start of Operations	3Q

Subproject 03 - 138kV Substation Modernization, NTS, Las Vegas, Nevada

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$ 11,992	$ 1,000	$ 2,667	$ 6,350 [c]	$ 1,975	$ 0 [c]	$ 0	4Q 1997 - 4Q 2000

This project will modernize one major substation (Frenchman Flat Substation), one switching center (Mercury Switching Center), and one tap station (Valley Tap) on the 138 kilovolt (kV) transmission system loop at the Nevada Test Site (NTS). It will also provide for the installation of a SCADA fiber-optics communication loop. The Mercury Switching Center serves as a termination point for the incoming power line from Nevada Power Company (NPC).

No major site improvements are proposed for the modernized facilities except possible site and access road grading.

Frenchman Flat Substation (FF), Canyon Substation (CA), Mercury Switching Center (MSC), and Valley Tap (VAT) will each require modifications to the control buildings. Each building will provide an adequate environment for electrical relays, switchgear, breaker control panels, and telecommunications equipment. Each control building will contain a heating, ventilation, and air conditioning HVAC system; a fire detection and alarm system; electrical power for interior and exit lighting; battery-powered emergency lighting; telephones; and fully insulated walls and ceilings. The substation, switching center and tap station will employ new gas breaker technology, microprocessor relays, supervisory control and data acquisition (SCADA) control of major equipment, and new SCADA fiber-optic cable for telecommunication requirements (relaying, metering, and telephone system).

The Frenchman Flat Substation is an important part of the overall NTS power system and feeds critical loads associated with laboratories' activities.

The Mercury Switching Center is the termination point for the NPC 138 kV transmission line, which provides the primary power source to the NTS. NPC metering is also located at this facility.

The Valley Tap Switchstation will be a relaying point on the 138 kV transmission loop to allow proper sectionalizing of the loop during fault conditions. This will maintain most of the users in service including Systems which accounts for over a third of the NTS power usage.

A SCADA fiber-optics loop will enhance or upgrade the existing communications system. This fiber-optics loop will employ approximately 115 miles of fiber-optic cable wrapped around the existing overhead static wire on the NTS 138 kV transmission line.

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[c] A reprogramming action that received final Congressional approval on November 5, 1998, increased FY 1999 funding by $3,683,000 and eliminated the FY 2001 funding requirement.

The 138 kV transmission loop with its associated facilities is the backbone of the entire NTS power system. Reliable power for all weapons testing programs, future missions, the Yucca Mountain Project, environmental programs, and many other projects and programs conducted at the NTS are dependent upon the reliability of these facilities. Maintenance of aging and failing equipment is becoming increasingly more difficult because many replacement parts are no longer available. The Mercury Switching Center is a key substation at the NTS and connects to the outside utility company (NPC), which provides electrical power to the site. Equipment failures in these facilities have a significant impact upon all NTS programs and the reliability of the entire power system.

Existing 138 kV power facilities at the NTS are approximately 28 to 38 years old. The substation and switching center to be modernized in this project are among some of the oldest facilities at the NTS. Over the past several years increased outages due to equipment failure have occurred on a more frequent basis and will continue to accelerate until replaced.

The existing power line carrier communications system used for supervisory control has been in service long past its useful life span, is obsolete and unreliable. Current power line carrier replacement projects have improved the communication capability as a stop gap measure only, using old existing fiber-optic cables and borrowed microwave facilities. When the new SCADA fiber-optic loop is installed, it will provide adequate speed and capacity for modern relaying, SCADA, and metering facilities. A new communications loop using fiber-optics technology is the most practical solution to provide a long-term, reliable communication system for the NTS power system.

This project is needed in order to avoid future high maintenance expenses and frequent power interruptions that the NTS has experienced during critical times, to reduce the risk of serious or fatal injuries to the workers who maintain the deteriorating system, and to enable NTS activities to activate its readiness capability, if called upon.

Project Milestones:

FY 1999:	Complete design and start construction on the SCADA fiber-optic communication loop	3Q
	Complete design and start construction on the 138 kV relay grades	4Q
	Start design for replacing circuit switchers at VAT and FF	4Q
FY 2000:	Complete construction of the SCADA fiber-optic communications loop	1Q
	Start design modifications for MSC transfer bus	2Q
	Complete design and start construction for replacing circuit switchers at VAT and FF	3Q
	Complete construction on the 138 kV relay upgrades	4Q
	Complete design and start construction on MSC transfer bus	4Q

Subproject 04 - Roof Reconstruction - Protection of Real Property, LLNL, Livermore, California

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$7,810	$ 3,000	$ 4,810	$ 0	$ 0	$ 0	$ 0	2Q FY 1998 - 2Q FY 1999

This project received its final funding in FY 1998. No additional funding is required.

Project Milestones:

FY 1999: Complete construction 2Q

Subproject 05 - Storm Drain, Sanitary Sewer, and Domestic Water Systems, Modernization, SNL, Albuquerque, New Mexico

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$15,374	$ 0	$ 1,483	$ 7,326	$ 665	$ 0	$ 5,900	1Q 1999 - 4Q 2003

Much of the storm drain system, sanitary sewer system, and water distribution system at SNL have been in place for 30 to 50 years. Studies and video inspection have shown that the systems are in need of rehabilitation and expansion. As time passes, utilities that support DOE programs will be threatened, and the probability of losses of equipment and time will increase. Systems in deteriorated condition have high maintenance costs.

This subproject at SNL will: (1) rehabilitate and enlarge the storm drain system to reduce the risk of flooding of existing facilities, reduce or eliminate risks of soil and groundwater contamination, and minimize maintenance costs caused by the erosion of unlined channels; (2) rehabilitate the sanitary sewer system to address the issues of old, deteriorating sewer lines, and the threat of contamination of soil and water due to leakage by rehabilitating sewer lines and manholes; and (3) improve the water distribution system and fire protection by tying into the new Kirtland Air Force Base (KAFB) lines, improving electronic controls, installing water meters, and replacing several deteriorated water lines.

One of Sandia's environmental missions is to be in full compliance with the Federal environmental regulations, including all appropriate permitting. Regulatory drivers for this subproject include the Safe Drinking Water Act, National Pollutant Discharge Elimination System, 40 CFR 122, 123, and 124, the Clean Water Act, DOE Order 6430.1A, and Tiger Team Finding SW/CF-04.

Storm Drain System

Comprehensive drainage system analyses have been completed for SNL. These system analyses showed that six facilities in Technical Areas I, II, and IV would be impacted by the 100-year floodplain, including Building 880, which houses several Cray mainframe computers, key to a number of programs. Eight facilities in Technical Areas III and V would be impacted by the 100-year floodplain. Improvement to and expansion of the storm drain system as described below would remove the facilities in Technical Areas I, II, III, IV, and V from the 100-year floodplain.

Camera equipment was used to inspect the storm drain lines in 1992 and showed that approximately 26,524 feet of storm drain systems require major repair or replacement to alleviate flooding and

structural failure. The majority of the failing system is in Technical Area I and has exceeded its 40-year design life.

A sedimentation and capacity analysis performed for existing earth-lined channels determined that existing utilities adjacent to the channels are at risk to damage due to erosion of the channel flow. The results show that no matter how well the channels are maintained, failure is imminent. Failure will lead to roads being washed out leading to Technical Area IV, overtopping of the channel, and possibly flooding of facilities. This project proposes to line the existing channels with concrete to prevent erosion, increase capacity, protect utilities, and reduce the amount of sediment carried downstream.

The following improvements will be made to the Storm Drain System:

- Enlarge the 9th Street and 17th Street storm drains to accommodate the 100-year developed-conditions runoff, including the diversion of flows from the 14th Street and G Street intersection.
- Line the 9th Street, 14th Street, 17th Street, and a portion of the 20th Street channels to eliminate erosion and minimize sediment transport.
- Install a storm-drain pipe in the 20th Street channel from Harding Blvd. to G Street.
- Construct berms, channels, and inlets and upsize culverts in Technical Areas III and V.
- Further integrate streets and storm inlets to ensure that storm flows can reach the storm sewer systems.
- Replace deteriorated storm drain inlets and manholes.

Sanitary Sewer System

A condition assessment report for the sewer system was completed in 1992 using in-line camera inspection data. The report was updated in 1995. The report categorized 25 percent of the sanitary sewer lines in Technical Areas I, II, and IV, and 164 sewer manholes as in either "poor" or "fair" condition. This means that several miles of pipe have a high probability of leaking industrial wastewater into the surrounding soil through cracks, separated joints, and corroded pipes. The worst section of pipe are also in danger of collapsing and backing wastewater up into buildings, many of which are critical to the mission of SNL. The proposed project will mitigate the poor condition of the system.

The following improvements will be made to the Sanitary Sewer System:

- Rehabilitate approximately 22,000 linear feet of the existing, deteriorated system using u-liner, slip lining, and open cut methods.
- Repair approximately 100 sewer manholes that are in "fair" or "poor" condition.

Water Distribution System

Under National Fire Protection Association codes, redundant water supply is required for fire protection. An important part of this project is to improve fire protection by providing a redundant water supply and a properly grided system. Kirtland Air Force Base (KAFB) is installing a new supply and distribution system. This project makes several ties to the SNL system to improve water distribution and fire protection in Technical Areas I, II, and IV.

The existing water distribution system does not have electronic storage-tank monitoring devices needed to monitor the system properly. SNL is responsible via an interagency agreement with the Air Force for the operation and maintenance of the water system within SNL boundaries. With basic electronic monitoring, SNL will be able to monitor the system with confidence.

SNL is currently unable to monitor water consumption. As part of a Memorandum of Understanding with Federal and state agencies, SNL has agreed to cooperate in a water conservation effort. This project will provide meters at tie-in points to the KAFB system and will provide consumption data. This data will be used as part of a water conservation effort.

The following improvements will be made to the water distribution system:

- Install electronic monitoring equipment on the system.
- Install water meters at connections between Sandia and KAFB.
- Rehabilitate or replace deteriorated water lines.

Project Milestones:

FY 1999:	Complete Title II Design for the Storm Drains	2Q
	Start Construction on the Storm Drains	2Q
	Start Construction on the Water System Meters and Controls	2Q
	Complete Construction on the Sanitary Sewers	4Q
	Complete Construction on the Water System Meters and Controls	4Q
FY 2000:	Complete 9th Street Storm Drain System	3Q

Subproject 06 - Site 300 Fire Station/Medical Facility, LLNL, Livermore, California

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start - Completion Dates
$ 5,350	$ 0	$ 900	$ 4,450	$ 0	$ 0	$ 0	3Q 1999 - 4Q 2000

This project received its final funding in FY 1999. No additional funding is required.

Project Milestones:

FY 1999:	Complete Title II Design	1Q
	Start Construction	3Q
FY 2000:	Complete Construction	4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	5,232	4,580
Design Management Costs (1.4% of TEC)	1,041	939
Project Management Costs (0.9% of TEC)	635	524
Total Design Costs (9.3% of TEC)	6,908	6,043
Construction Phase		
Improvements to Land	11,335	11,335
Buildings	8,616	8,616
Special Equipment	8,235	8,235
Other Structures	7,452	7,452
Utilities	14,219	13,847
Standard Equipment	200	200
Removal Cost Less Salvage	704	704
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	2,906	2,918
Construction Management (2.9% of TEC)	2,175	1,991
Project Management (2.1% of TEC)	1,522	1,384
Total Construction Costs (77.3% of TEC)	57,364	56,682
Contingencies		
Design Phase (1.5% of TEC)	1,122	1,206
Construction Phase (11.9% of TEC)	8,832	10,295
Total Contingencies (13.4% of TEC)	9,954	11,501
Total, Line Item Costs (TEC) [d]	74,226	74,226

5. Method of Performance

Design and procurement of the conventional facilities will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

[d] Rates used for escalation were taken from applicable DOE Departmental Price Change Indices, applied to the mid-point of the construction schedule.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	2,787	2,270	2,148	540	285	0	8,030
Construction	1,297	19,200	26,531	12,262	1,006	5,900	66,196
Total facility costs (Federal and Non-Federal)	4,084	21,470	28,679	12,802	1,291	5,900	74,226
Other project costs							
Conceptual design cost	1,072	0	0	0	0	0	1,072
Decontamination and Decommissioning (D&D)	10	0	0	0	0	0	10
NEPA documentation costs	124	0	0	0	0	0	124
Other ES&H costs	50	10	25	15	0	15	115
Other project-related costs	360	98	118	55	10	110	751
Total other project costs	1,616	108	143	70	10	125	2,072
Total Project Cost (TPC)	5,700	21,578	28,822	12,872	1,301	6,025	76,298

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--40 years)		
Facility operating costs	155	100
Facility maintenance and repair costs	208	208
Programmatic operating expenses directly related to the facility	660	660
Capital equipment not related to construction but related to the programmatic effort in the facility	0	50
GPP or other construction related to the programmatic effort in the facility	50	0
Utility costs	0	56
Other costs	1	0
Total related annual costs (operating from FY 2003 through FY 2042)	1,074	1,074

96-D-104, Processing and Environmental Technology Laboratory, Sandia National Laboratories, Albuquerque, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request *(Preliminary Estimate)*	2Q 1996	4Q 1997	1Q 1997	1Q 1999	45,900	48,600
FY 1997 Budget Request	2Q 1996	4Q 1997	1Q 1997	1Q 1999	45,900	49,000
FY 1998 Budget Request	2Q 1996	4Q 1997	1Q 1998	1Q 1999	45,900	49,000
FY 1999 Budget Request *(Title I and II Baseline)*	2Q 1996	4Q 1997	2Q 1998	4Q 2000	45,900	47,190
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1996	4Q 1997	2Q 1998	4Q 2000	45,900	47,082

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1996	1,980 [a]	1,980	893
1997	14,100	14,100	2,859
1998	0	0	5,029
1999	18,920	18,920	16,593
2000	10,900	10,900	20,455
2001	0	0	71

[a] Includes appropriation of $1,800,000 plus an internal reprogramming of $180,000 that was provided to allow management efficiencies achievable through coordination of engineering and design contracts.

3. Project Description, Justification and Scope

The Processing and Environmental Technology Laboratory (PETL) is a new laboratory/office facility to be located on a presently vacant site. The proposed building is a three-story building with a partial basement. The building will contain approximately 151,435 gross square feet with a total net square feet of 79,163. The Office/Laboratory consists of two primary functional areas, laboratory and office space. The offices are located at the perimeter of the facility, and the laboratories are in the center, and the service area is located at the west end. The building is designed to meet the latest ES&H requirements for facilities of this type. Vibration isolation, pedestrian circulation, emergency egress, separation between laboratory and technician work stations, and separate laboratory service corridors which serve as secondary emergency exits are all design responses to identified user requirements. The building will have a modular design to facilitate varying the size of laboratory and office spaces in minimum time and at low costs, as user requirements change. The building is oriented on an east-west axis to achieve maximum opportunity for solar gain along the south elevations.

Generally, interior walls are gypsum board over metal studs. Appropriate fire separation barriers will be provided as required by the Life Safety Code and the DOE order for fire protection. The structural system will consist of steel and/or concrete framing as required to meet the users' vibration criteria for sensitive equipment. Laboratory floor systems will likely be constructed with waffle or pan joist framing. The exterior finish of the building will be a low maintenance product that is designed to integrate with the existing campus architecture.

The heating, ventilating, and air conditioning systems include a double duct, variable air volume (VAV), perimeter heating/cooling system, and a core or interior single duct VAV system. Heating will be provided by piped hot water generated by a gas-fired boiler. A large thermal storage water tank filled with chilled water from existing chillers in Building 858 will provide cold water for building cooling and test equipment. Interior plumbing systems will include sanitary waste, domestic hot and cold water, compressed air, natural gas, and chilled water supply and return. Exhaust will be provided by utility fans located at the roof level, connected to exhaust duct risers in chases. Site utilities include a primary electric feeder, signal duct, water, natural gas, and sanitary sewer. Area improvements will include security fencing, storm drain inlets, and service and driveway areas. Landscaping, including trees, shrubs, irrigation systems and gravel, will be provided consistent with existing landscape practices.

The PETL is an important element that will enable the Department of Energy (DOE) Stockpile Stewardship and Management program to use an aggressive R&D program to develop production processes which will offer significant cost reductions and minimize the use of toxic materials. The synergism represented by PETL meets the DOE's objective in that it collocates individuals responsible for identifying and developing new materials and processes with those translating them to application.

The focus of PETL is the development, characterization, and application of modern processing while at the same time ensuring the safety of the environment and personnel, and producing products required for nuclear weapons applications. PETL allows the integration of real-time, on-line diagnostics, and test structures in processing lines for "self-identification" of processing problems. The substitution of environmentally safer processing chemicals will be analyzed to minimize design impact and to assess the affect on long-term compatibility. Analytical support for production of non-nuclear components will replace services provided by integrated complex plants, as the manufacturing complex is reduced in size and Manufacturing Development Engineering (MDE) increases.

Because DOE is faced with developing a more efficient complex to produce and to dismantle weapons, as well as to address ES&H issues affecting operations and nuclear weapon production, additional space is needed for efforts involving materials compatibility, aging, and reliability. These efforts are essential in certifying the reliability of the nuclear weapons stockpile.

PETL occupants will include: the Materials and Process Sciences Center, the Engineered Materials and Processes Center, and parts of the Environment Center and the Microelectronics Center. It will provide facilities for staff seeking timely solutions to the following critical problems:

- Assuring safety and reliability of a smaller stockpile incorporating new materials and processes for production.
- Elimination of some materials from nuclear weapons because of production/usage restrictions, or total bans, and increased requirements to minimize occupational exposure with minimum effect on the reliability of nuclear weapons.
- Substitution of environmentally safer materials and processes during nuclear weapon production, with minimum effect on the reliability of nuclear weapons.
- Elimination/reduction of hazardous waste (radioactive, mixed, or chemically hazardous) during nuclear weapon production and better treatment (including detoxification or stabilization) of newly generated hazardous wastes.
- Dismantling nuclear weapons in an environmentally acceptable and safe manner.
- Compliance by SNL and the Nuclear Weapons Complex with ES&H laws, regulations, DOE orders, and industry standards.

Currently, materials activities are divided among nine different buildings. PETL will allow these activities to be centralized into one facility. Because most of the current laboratories are located in old facilities, the move to PETL will assist in conforming to current and expected regulations, DOE orders, and best industry ES&H practices. The new building is designed to conduct environmentally and occupationally safe R&D involving hazardous materials used in weapon production.

Removal Plan:

The following buildings will be vacated by organizations proposing to move to the PETL:

Building	Year Acquired	Building Size (Net Square Feet)	Space Vacated (Net Square Feet)	Organization(s)
805	1959	48,471	40,923	1800
806	1961	39,640	8,565	1800
807	1966	52,845	3,561	1800
823	1982	79,667	3,503	6600
828	1946	11,475	1,064	1800
894	1950	75,514	302	1800
T-47	1979	3,273	1,356	1800
897	1995	81,534	3,000	1800
858	1985	71,648	5,437	1300
Total			67,711	

Building 828 is considered substandard and included in the SNL substandard and temporary abandoned building decontamination and disposal program under a separate, future expense-funded project. It is expected the other space vacated by future PETL occupants will be backfilled by technical and administrative organizations as part of the Lab-wide space planning strategy.

Project Milestones:

FY 1999:	Complete site construction (Chilled Water Tank)	2Q
FY 2000:	Equipment procurement	3Q
	Occupy building	3Q
	Complete building construction	4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $1,761)	3,254	3,254
Design Management Costs (1.2% of TEC)	556	556
Project Management Costs (0.7% of TEC)	323	323
Total Design Costs (9.0% of TEC)	4,133	4,133
Construction Phase		
Buildings	28,930	28,930
Special Equipment	4,897	4,897
Standard Equipment	1,295	1,295
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	1,611	1,611
Construction Management (0.7% of TEC)	324	324
Project Management (0.9% of TEC)	406	406
Total Construction Costs (81.6% of TEC)	37,463	37,463
Contingencies		
Construction Phase (9.4% of TEC)	4,304	4,304
Total Contingencies (9.4% of TEC)	4,304	4,304
Total, Line Item Costs (TEC) [b]	45,900	45,900

5. Method of Performance

Design and inspection shall be performed under a negotiated architect-engineering contract. Construction and procurement shall be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

[b] Escalation rates taken from the FY 1996 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	3,724	409	0	0	0	0	4,133
Construction	28	4,620	16,593	20,455	71	0	41,767
Total facility costs (Federal and Non-Federal)	3,752	5,029	16,593	20,455	71	0	45,900
Other project costs							
Conceptual design costs	220	0	0	0	0	0	220
NEPA documentation costs	90	0	0	0	0	0	90
Other ES&H costs	29	0	0	0	0	0	29
Other project-related costs [c]	801	12	15	15	0	0	843
Total other project costs	1,140	12	15	15	0	0	1,182
Total Project Cost (TPC)	4,892	5,041	16,608	20,470	71	0	47,082

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–50 years)		
Facility operating costs	631	631
Facility maintenance and repair costs	312	312
Programmatic operating expenses directly related to the facility [d]	45,903	45,903
Capital equipment not related to construction but related to the programmatic effort in the facility [e]	1,800	1,800
Utility costs [f]	610	610
Total related annual costs (operating from FY 2001 through 2050)	49,256	49,256

[c] Includes in-house engineering support, project development and project management costs prior to authorization, and non-dedicated support activities throughout this project life.

[d] Programmatic operating expenses directly related to the facility include salaries and supplies for approximately 200 people estimated at $229,518 per person per year.

[e] Capital equipment not related to construction but related to the programmatic effort in the facility is estimated using historical data associated with the annual replacement of worn-out analytical equipment

[f] Utility costs were estimated using the gas and electric consumption rates from the Title II Energy Conservation Report and water use data from other typical office/laboratory facilities at SNL/NM.

96-D-111, National Ignition Facility (NIF), Lawrence Livermore National Laboratory, Livermore, California

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request (*Preliminary Estimate*)	1Q 1996	1Q 1998	3Q 1997	3Q 2002	842,600	1,073,600
FY 1998 Budget Request (*Title I Baseline*)	1Q 1996	1Q 1998	3Q 1997	3Q 2003	1,045,700	1,198,900
FY 1999 Budget Request	1Q 1996	2Q 1998	3Q 1997	3Q 2003	1,045,700	1,198,900
FY 2000 Budget Request (*Current Baseline Estimate*)	1Q 1996	2Q 1998	3Q 1997	3Q 2003	1,045,700	1,198,900

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1996	37,400	37,400	33,990
1997	131,900	131,900	74,294
1998	197,800	197,800	165,389
1999	284,200	284,200	248,367
2000	248,100	248,100	214,440
2001	74,100	74,100	181,200
2002	65,000	65,000	110,680
2003	7,200	7,200	17,340

3. Project Description, Justification and Scope

The Project provides for the design, procurement, construction, assembly, installation, and acceptance testing of the National Ignition Facility (NIF), an experimental inertial confinement fusion facility intended to achieve controlled thermonuclear fusion in the laboratory by imploding a small capsule containing a mixture of the hydrogen isotopes, deuterium and tritium. The NIF is being constructed at the Lawrence Livermore National Laboratory (LLNL), Livermore, California as determined by the Record of Decision made on December 19, 1996, as a part of the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS).

The mission of the National Inertial Confinement Fusion (ICF) program is to achieve controlled thermonuclear fusion in the laboratory. This program supports the DOE mandate of maintaining nuclear weapons science expertise required for stewardship of the stockpile, testing of nuclear weapons effects, and the development of fusion power by providing a database for inertial fusion ignition. As a key element of the Stockpile Stewardship Program, the NIF is designed to achieve propagating fusion burn and modest (1-10) energy gain within 2-3 years of full operation and to conduct high energy density experiments, both through fusion ignitions and through direct application of the high laser power. This mission was identified in the NIF Justification of Mission Need, which was endorsed by the Secretary of Energy. Identification of target ignition as the next important step in ICF development for both defense and non-defense applications is consistent with the earlier (1990) recommendation of DOE's Fusion Policy Advisory Committee, and the National Academy of Sciences Inertial Fusion Review Group. In 1995, the DOE's Inertial Confinement Fusion Advisory Committee affirmed the program's readiness for an ignition experiment. A review by the JASONs in 1996 affirmed the value of the NIF for stockpile stewardship.

The NIF project supports the DOE mandate to maintain nuclear weapons science expertise required for stewardship of the stockpile. After the United States announcement of a moratorium on underground nuclear tests in 1992, the Department established the Stockpile Stewardship program to ensure the preservation of the core intellectual and technical competencies in nuclear weapons. In addition, as a means of reducing the danger posed by nuclear weapons proliferation, the President announced that the United States would seek a zero yield Comprehensive Test Ban Treaty (CTBT). The treaty was signed on September 24, 1996, and submitted to the Senate for ratification on September 23, 1997. One of the six safeguards that defines the terms of the CTBT is the conduct of the Stockpile Stewardship program to ensure the safety and reliability of the stockpile. The NIF is one of the most vital facilities in that program. The NIF will provide the capability to conduct laboratory experiments to address the high energy density and fusion aspects that are so important to both primaries and secondaries in stockpile weapons.

At present, the Nation's computational capabilities and scientific knowledge are inadequate to ascertain all of the performance and safety impacts from changes in the nuclear warhead physics packages due to aging, remanufacturing, or engineering and design alterations. Such changes are inevitable if the warheads in the stockpile are retained well into the next century, as expected. In the past, the impacts of such changes were evaluated through nuclear weapon tests. Without underground tests, we will require better, more accurate computational capabilities to assure the reliability and safety of the nuclear weapons stockpile for the indefinite future.

To achieve the required level of confidence in our predictive capability, it is essential that we have access to near-weapons conditions in laboratory experiments. The importance of nuclear weapons to our national security requires such confidence. For detonation of weapon primaries, that access is provided in part by hydrodynamic testing. For secondaries and for some aspects of primary performance, the NIF will be a principal laboratory experimental physics facility.

The most significant potential commercial application of ICF in the long term is the generation of electric power. Consistent with the recommendations of the Fusion Policy Advisory Committee, the NIF will provide a unique capability to address critical elements of the inertial fusion energy program by exploring moderate gain (1 to 10) target designs, establishing requirements for driver energy and target illumination for high gain targets, and developing materials and technologies useful for civilian inertial fusion power reactors.

The ignition of an inertial fusion capsule in the laboratory will produce extremely high temperatures and densities in matter. Thus, the NIF will also become a unique and valuable laboratory for experiments relevant to a number of areas of basic science and technology.

The NIF is an experimental fusion facility consisting of a laser and target area, and associated assembly and refurbishment capability. The laser will be capable of providing an output pulse with an energy of 1.8 megajoules (MJ) and an output pulse power of 500 terawatts (TW) at a wavelength of 0.35 micrometers (μm) and with specified symmetry, beam balance and pulse shape. The NIF design provides an experimental facility to house a multibeam line, neodymium (Nd) glass laser capable of generating and delivering the pulses to a target chamber. In the target chamber, a positioner will center a target containing fusion fuel, a deuterium-tritium mixture, for each experiment. Diagnostics provided by this project will provide the test data to demonstrate subsystem performance and initial operations.

The NIF experimental facility, titled the Laser and Target Area Building, will provide an optically stable and clean environment. This laser building will be shielded for radiation confinement around the target chamber and will be designed as a radiological, low-hazard facility capable of withstanding the natural phenomena specified for the LLNL site. The baseline facility is for one target chamber, but the design shall not preclude future upgrade for additional target chambers.

The NIF project consists of conventional and special facilities.

- Site and Conventional Facilities include the land improvements (e.g., grading, roads) and utilities (electricity, heating gas, water), as well as the laser building, which has an approximately 20,300 square meters footprint and 38,000 square meters in total area. It is a reinforced concrete and structural steel building that provides the vibration-free, shielded, and clean space for the installation of the laser, target area, and integrated control system. The laser building consists of two laser bays, each 31 meters (m) by 135 m long, and a central target area--a heavily shielded (1.8 m thick concrete) cylinder 32 m in diameter and 32 m high. The laser building includes security systems, radioactive confinement and shielding, control rooms, supporting utilities, fire protection, monitoring, and decontamination and waste handling areas. Optics assembly and refurbishment capability is provided for at LLNL by incorporation of an optics assembly area attached to the laser building and minor modifications of other existing site facilities.

- Special facilities include the Laser System, Target Area, Integrated Computer Control System, and Optics.
  - The laser system is designed to generate and deliver high power optical pulses to the target chamber. The system consists of 192 laser beamlets configured to illuminate the target surface with a specified symmetry, uniformity, and temporal pulse shape. The laser pulse originates in the pulse generation system. This precisely formatted low energy pulse is amplified in the main amplifier. To minimize intensity fluctuation, each beam is passed through a pinhole in a spatial filter on each of the four passes through the amplifier and through a transport spatial filter. The beam transport directs each high power laser beam to an array of ports distributed around the target chamber where the frequency of the laser light is tripled to 0.35 μm, spatially modulated by phase plates and focused on the target. Systems are provided for automatic control of alignment and the measurement of the power and energy of the beam. Structural support and auxiliary systems provide the stable platform and utilities required.
  - The target area includes a 10 m diameter, low activation (i.e., activated from radiation) aluminum vacuum chamber located in the Target Area of the laser building. Within this chamber, the target will be precisely located. The chamber and building structure provide confinement of radioactivity (e.g., x-rays, neutrons, tritium, and activation products). Diagnostics will be arranged around the chamber to demonstrate subsystem performance for project acceptance (TEC) and initial operations (TPC). Structural, utility and other support systems necessary for safe operation and maintenance will also be provided in the Target Area. The target chamber and staging areas will be capable of conducting experiments with cryogenic targets. The Experimental Plan indicates that cryogenic target experiments for ignition will be needed 2-3 years after completion of the project. Therefore, the targets and this cryogenic capability will be supplied by the experiments. The NIF project will make mechanical and electrical provisions necessary to position and align the cryogenic targets within the chamber. The baseline is for indirectly driven targets. An option for future modifications to permit directly driven targets is included in the design.
  - The integrated computer control system includes the computer systems (note: no individual computer will cost over $100,000) required to control the laser and target systems. The system will provide the hardware and software necessary to support NIF operations. Also included is an integrated timing system for experimental control of laser and diagnostic operations. Safety interlocks and access control will also be provided.
  - Thousands of optical components will be required for the 192 beamlet NIF. These components include laser glass, lenses, mirrors, polarizers, deuterated potassium dihydrogen phosphate crystals, pulse generation optics, debris shields and windows, and the required optics coatings. Optics includes quality control equipment to receive, inspect, characterize, and refurbish the optical elements.

Project Milestones:

Project milestones for FY 1999 and FY 2000 include:

- FY 1999
  - Special Equipment Installation Started 1Q
  - Target Bay ready for Target Chamber Installation 2Q
  - Optics Assembly Building Complete (certified cleanrooms) 4Q
- FY 2000
  - Switchyard #2 Steel Structures Complete 1Q
  - Optics Facilitization Complete 1Q
  - Conventional Construction Complete and following will be commissioned for installation of Special Equipment:
    - Switchyard #2 3Q
    - Laser Bay #2 4Q
    - Target Bay 4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	101,143	76,883
Design Management Costs (2.1% of TEC)	21,900	18,387
Project Management Costs (2.1% of TEC)	22,000	15,100
Total Design Costs (13.9% of TEC)	145,043	110,370
Construction Phase		
Improvements to Land	1,800	1,800
Buildings	170,724	159,280
Special Equipment	520,802	515,700
Utilities	500	500
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	73,250	73,250
Construction Management (2.2% of TEC)	22,800	21,500
Project Management (3.0% of TEC)	31,500	31,500
Total Construction Costs (78.5% of TEC)	821,376	803,530
Contingencies		
Design Phase (0.0% of TEC)	1,000	11,800
Construction Phase (7.5% of TEC)	78,281	120,000
Total Contingencies (7.6% of TEC)	79,281	131,800
Total, Line Item Costs (TEC) [a b]	1,045,700	1,045,700

The cost estimate assumes a project organization and cost distribution consistent with the management requirements appropriate for a DOE Strategic System as outlined in the DOE Order 430.1, Life Cycle Asset Management and the NIF Project Execution Plan. Actual cost distribution will be in conformance with accounting guidelines in place at the time of project execution.

[a] Escalation rates taken from the FY 1998 DOE escalation multiplier tables.

[b] Based on completion of Title II design for Conventional Facilities and 89 percent of Title II design for Special Equipment as of December 1998.

5. Method of Performance

The NIF Laboratory Project Office (consisting of LLNL, LANL, SNL, and UR/LLE and supported by competitively-selected contracts with Architect Engineering firms, a Construction Manager, equipment and material vendors, and construction firms) will prepare the design, procure equipment and materials, and perform conventional construction, safety, system analysis, and acceptance tests. DOE will maintain oversight and coordination through the Headquarters Office of Inertial Fusion and the National Ignition Facility Project and the field office. DOE conducted the site selection and the NEPA determination. LLNL was selected as the construction site in the Record of Decision made on December 19, 1996. The procurement and installation/test of special equipment will be performed by the NIF Laboratory Project Office. Inspection and Title III engineering contracts for the conventional systems will be competitively awarded. NIF start-up will be conducted by the NIF laboratory operations staff.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs [c]							
Total facility costs							
Design	96,199	46,844	2,750	250	0	0	146,043
Construction	12,085	118,545	245,617	214,190	181,200	128,020	899,657
Total facility costs (Federal and Non-Federal)	108,284	165,389	248,367	214,440	181,200	128,020	1,045,700
Other project costs							
R&D necessary to complete construction [d]	34,552	50,574	14,234	1,940	0	0	101,300
Conceptual design cost [e]	12,300	0	0	0	0	0	12,300
NEPA documentation costs [f]	3,166	588	846	300	150	0	5,050
Other project-related costs [g]	16,385	2,430	2,235	5,050	6,120	2,330	34,550
Total other project costs	66,403	53,592	17,315	7,290	6,270	2,330	153,200
Total Project Cost (TPC)	174,687	218,981	265,682	221,730	187,470	130,350	1,198,900
Budget Authority (BA) requirements							
TEC [h]	169,300	197,800	284,200	248,100	74,100	72,200	1,045,700
OPC [i]	101,000	31,300	6,800	5,900	5,900	2,300	153,200
Total, BA requirements	270,300	229,100	291,000	254,000	80,000	74,500	1,198,900

[c] Prior year actuals are changed to reconcile with DOE Financial Information System (FIS) costs through FY 1998 and cost profiles for FY 1999 and beyond are updated to reflect project-to-date actuals and contingency allocations as of December 10 ,1998.

[d] Costs include optics vendor facilitization ($73,600,000) and optics quality assurance ($27,700,000).

[e] Includes original conceptual design report completed in FY 1994 ($12,000,000) and the conceptual design activities for the optical assembly and refurbishment capability and site infrastructure ($300,000).

[f] Includes preparation of the NIF portion of the Stockpile Stewardship and Management Programmatic Environmental Impact Statement ($3,050,000) and environmental monitoring and permits ($2,000,000).

[g] Includes engineering studies (including advanced conceptual design) of project options ($5,800,000); assurances, safety analysis, and integration ($9,450,000); start-up planning, management, training and staffing ($8,930,000); procedure preparation ($1,000,000); operating spares ($600,000); startup ($6,550,000); and Operational Readiness Review ($2,220,000).

[h] Specific long-lead procurements and contracts (e.g., building construction; major laser, optics, target area special equipment) require BA in advance of costs.

[i] Specific long-lead procurements and contracts (e.g., optics facilitization) require BA in advance of costs.

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–30 years)		
Facility operating costs [j]	21,200	20,600
Facility maintenance and repair costs [k]	33,200	32,400
Programmatic operating expenses directly related to the facility [l]	61,100	59,600
Capital equipment not related to construction but related to the programmatic effort in the facility [m]	200	200
GPP or other construction related to the programmatic effort in the facility [n]	200	200
Utility costs [o]	9,000	8,800
Other costs [p]	6,300	6,200
Total related annual costs (operating from FY 2003 through FY 2032)	131,200 [q]	128,000 [r]

[j] Includes operator labor, engineering support and materials for upgrades and modifications, and consumables for operation of special equipment.

[k] Includes cost of labor, engineering support, and consumables for special equipment maintenance and refurbishment, including optics. Also includes maintenance for the laser building and support buildings.

[l] The current NOVA experimental program, including LLNL, LANL, SNL, and General Atomics, is approximately $41,100,000 annually. Based on use of complex cryogenic targets, increased diagnostics support, and higher levels of three dimensional physics modeling, the annual direct NIF experimental program costs are estimated at $61,100,000 This primary experimental operating expense will be included in the base Inertial Confinement Fusion Program budget. Additional program costs will be associated with use of the facility.

[m] Fabrication accounts, procurements, such as small lasers and some laser parts, Computer-Aided Design systems, etc. to support upgrades.

[n] Minor additions and modifications to the facility related to programmatic effort

[o] Electricity only. Gas, sewer, water, etc. are paid out of the General and Administrative budget.

[p] Nitrogen and argon for laser and transport beam tubes, stock inventory, and procurement support.

[q] In FY 2000 dollars.

[r] In FY 1999 dollars

Stockpile Management

Program Mission

The Weapons Stockpile Management program supports the enduring stockpile as directed in the Nuclear Weapons Stockpile Plan; assures the availability of adequate supplies of tritium to meet the requirements of the enduring stockpile; provides safe and secure storage of nuclear materials and components to prevent proliferation of capabilities, technologies and systems; provides the ability to respond to potential or real weapon incidents/accidents, and also to respond to continuing and evolving nuclear terrorist threats; and provides a flexible infrastructure capable of supporting changing stockpile sizes.

Program Goal

- Provide high confidence in the safety, security, reliability and performance of the enduring U.S. stockpile, without nuclear testing, to ensure the effectiveness of the U.S. nuclear deterrent while simultaneously supporting U.S. arms control and nonproliferation objectives.
- Provide the ability to resume U.S. underground nuclear testing and reconstitute nuclear weapons production capacities, consistent with Presidential directives, the Nuclear Posture Review, and the START I treaty, should national security so demand in the future.

Program Objectives

There are four national security objectives from the U.S. Department of Energy Strategic Plan upon which this program and budget are based; three of these apply to Stockpile Management:

- Maintain confidence in the safety, reliability and performance of the nuclear weapon stockpile without nuclear testing.
- Ensure the vitality of DOE's national security enterprise.
- Reduce nuclear weapon stockpiles and the proliferation threat caused by the possible diversion of nuclear materials.

Strategies

Weapons Stockpile Management supports the following strategies from the national security section of the U.S. DOE Strategic Plan:

- Extend the life of U.S. nuclear weapons by continuing the Stockpile Life Extension Program and stockpile maintenance activities.
- Improve detection and prediction capabilities for assessing nuclear weapon component performance and the effects of aging.
- Continually evaluate the safety, reliability and performance of the nuclear weapon stockpile.
- Provide a reliable source of tritium for the nuclear weapons stockpile.
- Provide an appropriately sized, cost effective, safe, secure and environmentally sound national security enterprise.

- Ensure that sufficient scientific and technical personnel are available to meet DOE's long term national security requirements.
- Ensure and enhance protection of nuclear materials, sensitive information, and facilities.
- Maintain test readiness and maintain and enhance emergency response and management capabilities to address any nuclear weapons, radiological or other emergency in the U.S. or abroad.
- Dismantle nuclear warheads that have been removed from the U.S. nuclear weapons stockpile in a safe and secure manner.

Performance Measures

For FY 2000, the significant overall performance measures for the Stockpile Management program include:

- Meeting production schedules in the Program Control Documents (PCD) for gas generators, reservoirs, and recertified neutron generators such that no weapon is inoperable due to the lack of these replacement components.
- Meeting the annual weapons alteration and modification schedules contained in the Production and Planning Directive (P&PD) and further delineated in the Program Control Document (PCD).
- Maintain production schedule of replacement parts for the W87 Life Extension Program.
- Adhere to schedules for the safe and secure dismantlement of about 375 warheads that have been removed from the U.S. nuclear weapons stockpile.
- Adhering to schedules in the Enhanced Surveillance Program (ESP) Plan for activities that enhance knowledge of weapon-relevant physical processes affecting aging and operation of weapon components. Focus remains on conclusion of the ESP by the end of FY 2002.
- Certifying that standards for the safety, reliability, and performance of the nuclear weapons stockpile are met.
- Completing revalidation of the W76 using two teams of experts from the design labs.
- Assuring that all facilities required for successful achievement of the Stockpile Stewardship and Management Plan are operational.
- Meet the established schedules for downsizing and modernizing our production facilities.
- Adhere to schedules set forth in the Advanced Design and Production Technology Plan.
- Meet schedules to rebuild, qualify and certify Trident II pits by FY 2001 and develop intermediate pit production capability of 20 pits per year at the Los Alamos National Laboratory by 2007.
- Continue, in FY 2000, material protection, control, and accountability upgrades at three DOE facilities with weapons-usable material. Prepare to transition Building 3019 at the Oak Ridge National Laboratory to the Office of Environmental Restoration and Waste Management in FY 2001.
- No loss of U.S. origin nuclear materials in the U.S. and abroad from theft, loss, or illicit trafficking.

- Maintaining robust emergency response assets in accordance with Presidential Decision Directive 39, The Atomic Energy Act and Executive Order 12656 to ensure Departmental response to any nuclear weapons or radiological emergency in the United States or abroad.
- Continuing ongoing efforts of exercises, training and drills to improve response readiness to any possible weapons of mass destruction and terrorist threat contingency.
- Implementation of the December 22, 1998, tritium source decision.

Significant Accomplishments and Program Shifts

During FY 1998 and FY 1999, implementation of the Stockpile Management Program continued in accordance with the Stockpile Stewardship and Management Plan and resulted in the following accomplishments:

- Delivered limited life components consistent with Production and Planning Directive 98-0.
- Supported weapon refurbishment consistent with Production and Planning Directive 98-0.
- Successfully completed certification of the safety and reliability of the U.S. nuclear weapons stockpile according to DOE/DoD procedures.
- Delivered first W88 early development unit pit in February 1998.
- Delivered the first five of 21 new safeguards transporters in FY 1998.
- Continuing ongoing efforts of exercises, training and drills to improve response readiness to any possible weapons of mass destruction and terrorist threat contingency.
- Adhering to schedules for the safe and secure dismantlement of 1,062 nuclear warheads in FY 1998 and about 275 in FY 1999 that have been removed from the U.S. nuclear weapons stockpile.
- Beginning Title I design for Stockpile Management Restructuring Initiative projects at the Savannah River Site and the Y-12 Plant to downsize production capacities.
- Completing resumption of Phase A of the Y-12 special nuclear material operations .
- Completed consolidation transfer of all pits from SRS to Pantex.
- Plan to complete Y-12 receipt of HEU parts and Pantex receipt of pits from RFETS in FY 1999.
- Implemented additional high explosive tests into the surveillance program (high explosive divergence and detonator booster performance tests).
- Flew first enhanced fidelity instrumented flight test.
- Completed preparation for accelerated aging experiments for plutonium.
- Completed modeling of safety and reliability critical strong links and firesets.
- Implemented Secure Connectivity between the plants and the laboratories, including secure E-mail and File Transfer Protocol.
- Demonstrated collaborative exchange of assembly product models for concurrent evaluation of SLEP and alternative designs between the plants and the laboratories.

Budget Structure

The Weapons Stockpile Management decision unit budget request is organized in the following manner:

Core Stockpile Management: This program includes lifetime surety, maintenance, surveillance, evaluation, repair, and reliability of the enduring stockpile; weapons dismantlement and disposal; maintenance of weapons design and production capability to include archiving, life extension studies, and retrofits; development of safe weapon assembly and disassembly processes; development and operation of safe, secure systems for transporting nuclear weapons and components; and operation of a complex that meets environment, safety, and health requirements. This program also includes the consolidation of nonnuclear manufacturing efforts within the weapons complex, including the transfer and requalification of 25 technologies and processes at various receiver sites through nonnuclear reconfiguration.

Enhanced Surveillance: The Enhanced Surveillance Program has been implemented to address the uncertainty of the aging stockpile. The absence of new weapon system development and a downsized production complex makes it difficult to correct defects as rapidly as before. The ESP will develop tools, techniques, and models for measuring, qualifying, calculating, and predicting the effects of aging on weapons materials and components and understanding these effects as they affect weapons safety and reliability. Stockpile Management funding supports this effort at the plants and laboratories.

Advanced Manufacturing, Design and Production Technologies: The Advanced Manufacturing, Design & Production Technologies program will focus on re-engineering and modernizing the weapons complex into a modern, agile, and fully integrated operation capable of responding to a wide range of production requirements. This effort encompasses enterprise integration which is aimed at improving information flow and the way the complex accomplishes its day-to-day business; agile manufacturing which is concerned with the development of computer aided/automated direct manufacturing systems utilizing new secure connectivity; process development which focuses on continuous and innovative improvement of individual manufacturing procedures and incorporation of advanced systems into the complex; and the development and documentation of a hedge strategy to rapidly expand production capability in case of a national security requirement.

Radiological/Nuclear Accident Response: This program ensures the maintenance of the Department's technical and operational capabilities for responding to radiological accidents/incidents or malevolent nuclear incidents worldwide. Radiological/Nuclear Accident Response assets include the Nuclear Emergency Search Team, Federal Radiological Monitoring and Assessment Center, Aerial Measuring System, Atmospheric Release Advisory Capability, Accident Response Group, Radiological Assistance Program, and Radiation Emergency Assistance Center/Training Site.

Tritium Source: This program will implement the Secretarial Record of Decision, as announced in December 1998, which selected the Commercial Light Water Reactor option as the primary technology for the production of tritium with the linear accelerator to be developed as backup technology.

Materials: Responsibility for funding the majority of these activities has been transferred to the Office of Environmental Management. Residual activities include the processing of highly enriched uranium scrap from across the complex, the storing and safeguarding of excess uranium-233 at the Oak Ridge National Laboratory (ORNL), and the recovery of plutonium-242 and fabrication of californium sources at ORNL.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Stockpile Management					
Core Stockpile Management					
Operations & Maintenance ..	1,418,823	1,553,261	-30,507 [a]	1,522,754	1,457,321
Construction	83,370	97,658	0	97,658	94,679
Total, Core Stockpile Management	1,502,193	1,650,919	-30,507	1,620,412	1,552,000
Enhanced Surveillance					
Operations & Maintenance ..	48,714	81,511	0	81,511	85,290
Advanced Manufacturing, Design and Production Technologies					
Operations & Maintenance ..	90,098	79,520	0	79,520	85,000
Radiological Nuclear Accident Response					
Operations & Maintenance ..	78,808	77,600	-1,400 [b]	76,200	77,600
Tritium Source					
Operations & Maintenance ..	183,340	167,000	-26,000 [c]	141,000	106,000
Construction	77,515	0	26,000	26,000	64,000
Total, Tritium Source	260,855	167,000	0	167,000	170,000
Materials					
Operations & Maintenance ..	60,419	27,911	0	27,911	28,410
Subtotal, Stockpile Management	2,041,087	2,084,461	-31,907	2,052,554	1,998,300
Prior Year Work Conducted in FY 1999	0	0	+28,558	28,558	0

[a] Reflects Stockpile Management allocation of appropriated use of prior year balances, taken as reductions to new budget authority: Core Management-$36,978,000; and reapplication of available prior year balances to cover FY 1999 program activities: Core Management $6,474,000.

[b] Reflects Stockpile Management allocation of appropriated use of prior year balances, taken as reductions to new budget authority: Radiological/Nuclear Accident Response $1,400,000.

[c] Reflects approval of Tritium Source reprogramming from operations and maintenance to construction, approved by Congress in January 1999.

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Stockpile Management					
Subtotal, Stockpile Management	2,041,087	2,084,461	-3,349	2,081,112	1,998,300
Use of Prior Year Balances .	-1,870	-38,381	+3,349	-35,032	0
Total, Stockpile Management . .	2,039,217	2,046,080	0	2,046,080	1,998,300

Explanation of Funding Changes from FY 1999 to FY 2000

The FY 2000 request for Stockpile Management is approximately $54 million below the FY 1999 obligational level. Minor growth is reflected in the Enhanced Surveillance (ESP) and Advanced Manufacturing, Design Production Technologies (ADAPT) areas to continue moving the complex toward the technological state it must achieve for modern operations. Funding also increases by $3 million to support implementation of the Secretarial decision on the new Tritium Source announced on December 22, 1998. These minor increases are more than offset by Infrastructure reductions in core operations and maintenance and construction funding. No FY 2000 funding is being requested for Project 99-D-123, Replace Mechanical Utility Systems at the Y-12 Plant or for Project 99-D-125, Replace Boilers and Controls at the Kansas City Plant. These projects have been deferred to allow execution of Congressionally directed external assessment of these projects to be completed. Any recommendations related to the scope or schedule of these projects will be addressed in the FY 2001 budget submission. Additionally, no FY 2000 funding is being requested for project 97-D-122, Nuclear Materials Storage Facility Renovation at Los Alamos National Laboratory. Questions regarding approach, design and costs remain. Answers to these questions and accompanying decision process are out of sync with the FY 2000 budget cycle. It is anticipated that additional information will be provided to Congress once a path forward is developed. Additional details on these changes are provided within the section titled, "Detailed Program Justification."

The Stockpile Management budget was formulated based on the following priorities: maintain infrastructure essential for operations; support limited life component exchange; provide for stockpile surveillance/evaluation; support enhanced surveillance focused on efforts supporting Stockpile Life Extension Program decision points; support the W87 LEP and directed weapon modifications and alterations; reestablish pit production capability and capacity; support commitments to entities external to Defense Programs, such as the Defense Nuclear Facilities Safety Board (DNFSB); support the ADAPT program and remaining ESP tasks consistent with program plans; and support the dismantlement of retired weapons.

The request is consistent with these priorities, recognizing that the deployment of resources must be balanced to support activities with specific near-term deliverables while moving the complex toward the long-term technological state it must achieve for modern operations. Stockpile maintenance efforts will focus on limited life component exchange consistent with the START I stockpile, the W87 Life Extension Program (LEP), and alterations to the B61 and B83. Stockpile Evaluation funding is driven by lab testing and flight testing for the W76, W87 and W88. Dismantlement work will focus on continuation of the W56 and W79, and startup efforts of the B53 for projected dismantlement of

approximately 375 weapons. Funding for the Transportation Program decreases by $3.8 million. While deliveries of new SafeGuards Transporters (SGT) for FY 1999 and FY 2000 are constant (six per year), funding requirements for the Transportation Program declines in FY 2000, reflecting the inclusion of long-lead procurement in the FY 1999 program. Defense Programs had originally planned to produce seventeen SGTs to replace older Safe Secure Trailers (SST). However, based on cost benefit analysis of maintaining the older SST fleet or procuring additional SGTs, DP has decided to exercise its option to replace 4 additional SSTs with SGTs. These four additional units are scheduled for delivery in FY 2001 and will bring the fleet of SGTs up to 21 units.

Recapture of pit production efforts technologies for the W88, B61-7 and W87 will continue at LANL. Fabrication of W88 pits for certification and qualification will continue toward the goal of providing war-reserve pits for the stockpile in 2001. Safety infrastructure replacements and pit manufacturing improvements will be supported through the Transition Manufacturing and Safety Equipment initiative. Stockpile Management Restructuring Initiative (SMRI) efforts will continue at the four production plants with the goal of having a smaller and more cost effective complex in place by FY 2005. ESP efforts will continue the development of predictive capabilities and diagnostic tools to provide critical aging data needed to support the Stockpile Life Extension Program (SLEP) decision process. ADAPT will continue to develop and deploy advanced product design and manufacturing technologies needed for a modern, effective and efficient design and production operation. Examples include the development and deployment of an integrated set of product and process simulation tools for neutron generator product realization and the development and deployment of advanced processing technologies needed to reestablish pit production capability to meet SLEP requirements.

Stockpile Management Restructuring Initiative

The Stockpile Management Restructuring Initiative (SMRI) supports the implementation of Departmental decisions related to production facility downsizing and modernization consistent with the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (PEIS) and the Tritium Supply and Recycling Programmatic Environmental Impact Statement Records of Decision (ROD). The ROD for restructuring the stockpile management complex was announced on December 19, 1996 and the ROD for the Tritium Supply and Recycling PEIS was announced on December 5, 1995. They involve the downsizing in place of weapons assembly/disassembly and high explosives at the Pantex Plant, nonnuclear component fabrication at the Kansas City Plant, weapons secondary and case fabrication at the Y-12 Plant, and the consolidation of existing tritium operations at the Savannah River Site. In FY 1998, the Department began Title I design for the SMRI projects at the Savannah River Site and the Y-12 Plant. In FY 1999, the Department will focus on completing Title I and starting Title II design for the SMRI projects at Savannah River and Y-12 and beginning the Title I Design for the SMRI projects at the Kansas City and Pantex Plants. FY 2000 activities include completing and continuing Title I and II design activities and continuing or beginning contract activities at the SMRI project sites. The FY 2000 request includes $72 million in operations and maintenance and construction funding to support these efforts. Funding associated with the SMRI will continue through FY 2004 and physical construction through FY 2005.

Pit Production and Plutonium Handling Infrastructure Improvements

At the Los Alamos National Laboratory, Defense Programs is re-instituting a war reserve pit production capability that has not existed since production activities ceased at the Rocky Flats Plant. In accordance with the Record of Decision on the Programmatic Environmental Impact Statement, the current

objective is to establish a long-term capacity for manufacturing up to 50 pits/year with a single shift of personnel. In the nearer term, we will achieve an annual capacity of 20 pits by 2007. A decision will be made on the specific manufacturing capacity to be put in place and how best to achieve that capacity through discussions with the Department of Defense.

The Pit Production Program consists of several parts: 1) a project to assure initially the capability to build war reserve pits has been captured; 2) a development and manufacturing period focused on meeting near term stockpile support requirements; 3) emplacement of a set manufacturing capacity for long term support of the stockpile; and 4) development of a contingency plan to allow the Department to move to higher rates of manufacturing should unforeseen requirements emerge in the future.

In FY 1998, sufficient work through the Pit Rebuild Program was completed to verify that the Los Alamos National Laboratory has the capability to build W88 war reserve pits. Work in FY 1999 and FY 2000 will build on the FY 1998 program: approximately 30 pits will be fabricated for certification and qualification with the goal of having a war reserve W88 pit available for the stockpile in 2001. Fabrication of W88 pit for the stockpile will be continuous to assure "lot" integrity for certification purposes, with small down time periods for facility maintenance and replacement of aged manufacturing equipment as required. The Capability Maintenance Improvement Project, now planned as a FY 2002 new start, will be the construction project for facility improvements/upgrades beyond maintenance and replacement in-kind of equipment necessary to support the near-term manufacturing requirements. In addition, Technology Development Units of the B61-7 and W87 will be built.

Development of a contingency plan for larger quantity manufacturing is planned once sufficient information from the Pit Rebuild Program and subsequent manufacturing of war reserve pits clarifies the processes and specific equipment for manufacturing.

Plutonium handling infrastructure improvements are supported under the Transition Manufacturing and Safety Equipment initiative and the following construction projects: 99-D-132 Nuclear Materials Safeguards and Security Upgrades, 97-D-122 Nuclear Materials Storage Facility Renovation, and 95-D-102 Chemistry and Metallurgy Research Building Upgrade Project.

Production Capacity for START I

Consistent with the Administration's "Lead and Hedge" strategy, the FY 2000 request includes $20.3 million to continue efforts initiated in FY 1999 to support capacity expansion for production of limited life components at the Kansas City Plant, Sandia National Laboratories, and Los Alamos National Laboratory, in order to support START I requirements or to return to START I levels in a timely manner once START II is ratified (hedge strategy). This $20.3 million includes $11.7 million in construction funding (Project 99-D-122, Rapid Reactivation, Various Locations) for facility modifications at SNL and additional equipment required to support the additional capacity requirements at SNL and LANL. Specifically, it will support the design, construction, and installation of a third target loader within existing space of the Neutron Tube Target Loading Facility at LANL; rearranging existing space in, and adding additional space to, the current Reservoir Assembly Facility; and rearranging existing space within Building 870, adding additional space in an adjacent building, and the procurement of additional production equipment at SNL. It also includes $8.6 million in operations and maintenance funding which provides project support and management for construction activities, NEPA Documentation, component prebuilds, installation of equipment, qualification and process prove-in, and additional manpower to support the increased production levels. This additional capacity is scheduled to be on line

and qualified for war reserve production by FY 2003. To support START I requirements through FY 2003, neutron generators returned from the field will be recertified and reapplied for their remaining life and 544 neutron generators will be shipped from inventory at Pinellas.

Weapons Production Complex Infrastructure

The nuclear weapons complex is expected to experience ongoing consolidation over the next five to ten years. The goal of the consolidation effort is to configure into a complex that is smaller, more flexible, and much less expensive to operate. By the year 2001, nonnuclear manufacturing and processing capabilities will be consolidated at the Kansas City Plant, the Savannah River Site, the Los Alamos National Laboratory (LANL), and Sandia National Laboratories (SNL).

Several important Environmental Impact Statements (EIS) have recently been completed or are underway within the Department that will assist in defining alternatives that will lead to a consolidated nuclear weapons complex in the twenty-first century: 1) a Stockpile Stewardship and Management PEIS which was completed in early FY 1997 2) a Pantex Site-wide Environmental Impact Statement (SWEIS) which was completed in early FY 1997; 3) a LANL SWEIS which is scheduled for completion by the end of the 2nd quarter of FY 1999; 4) a SNL/NM SWEIS which is scheduled for completion by the end of FY 2000; and 5) a Notice of Intent to prepare a Y-12 SWEIS is expected to be published in February 1999 with a goal of completion by 3rd quarter of FY 2000.

The Oak Ridge Operations Office and the Y-12 Plant have initiated the Y-12 Site Integrated Modernization (Y-SIM) Program. This effort will plan and implement the strategic modernization of key process facilities at the Y-12 Plant through the next decade. The program will be executed in phases involving a series of capital projects. In FY 2000, activities will include: requirements development & verification, facility assessment, operating plan development, technology assessment & planning, alternatives development, site selection & characterization, utility & infrastructure plans, safety authorization basis, plant concepts/cost/schedule, and baseline selection. In concert with this effort, a SWEIS is being initiated. In FY 2000, the estimated funding required for the modernization planning effort is $10 million and the funding required for the SWEIS is $15 million.

On June 4, 1998, the Department issued a public notice that it was actively considering a concept for consolidating up to six existing contracts for nuclear weapons production activities into a single contract. Departmental analysis indicated that a consolidated contract approach would provide clearer lines of authority and responsibility, improve information sharing, cooperation and technical integration, and provide cost savings through single business and technical support efficiencies and eliminate duplicative functions among multiple contractors. This notice requested that written comments be submitted by July 15, 1998, and invited interested parties to request one-on-one meetings with Department officials. The Department received oral or written comments from 37 individuals, 17 companies, 2 community interest groups and 1 union.

Following analysis of stakeholder comments, the Department has modified its contract consolidation proposal to include three sites: the Pantex Plant in Amarillo, Texas; the Kansas City Plant in Kansas City, Missouri; and the Y-12 Plant in Oak Ridge, Tennessee. On December 21, 1998, the Secretary announced that he had ordered a review of the management structure throughout the Department before making a final decision on the consolidation proposal. This review will be conducted by an internal task force and will look at broad management issues, including the responsibilities and reporting relationships between field offices and headquarters; the governance structure for headquarters, field

operations, contractors and facilities; career development opportunities for employees, and management and accountability on large construction and cleanup projects. The contracts for the Y-12 and Kansas City Plants will be extended 15 months, expiring in June 2001. The Department will exercise options on the Pantex contract so that it will also expire in June 2001. These extensions will provide the time needed to conduct a competitive procurement process and transition to a new contract.

Tritium

On December 5, 1995, DOE issued a Tritium Supply and Recycling Record of Decision (ROD), that selected the two most promising alternative technologies for tritium production and established a dual-track strategy that would, within 3 years, select one of those technologies to become the primary tritium supply technology. The other technology, if feasible would be developed as a backup tritium source. Under the dual-track strategy, DOE would: 1) initiate the purchase of an existing commercial reactor (operating or partially complete) or irradiation build, and test critical components of an accelerator system for tritium production. Any new facilities that might be required, the production-scale accelerator and a Tritium Extraction Facility to support the commercial reactor alternative, would be constructed at DOE's Savannah River Site in South Carolina. The ROD also stated that DOE's Fast Flux Test Facility at the Hanford Reservation in Washington would be examined for a possible tritium production role although it had been previously rejected as a reasonable alternative.

On December 22, 1998, the Secretary of Energy announced his decision to select the use of commercial light water reactors for tritium production. The preferred reactors are the Watts Bar reactor and Sequoyah reactors located in Tennessee. Each of these reactors is operated by the Tennessee Valley Authority, an independent government agency. The linear accelerator option was designated a "backup" technology. The Fast Flux Test Facility will have no tritium production role. This ROD revises the December 1995 Tritium Supply and Recycling Record of Decision and completes the process of selecting a single technology for tritium production.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office ...	150,926	123,567	85,756	-37,811	-30.6%
Kansas City Plant	293,632	294,222	287,567	-6,655	-2.3%
Los Alamos National Laboratory .	315,304	354,108	313,195	-40,913	-11.6%
Pantex Plant	259,762	260,221	240,878	-19,343	-7.4%
Sandia National Laboratories ...	229,008	249,060	252,462	3,402	1.4%
Total, Albuquerque Operations Office	1,248,632	1,281,178	1,179,858	-101,320	-7.9%
Chicago Operations Office					
Brookhaven National Laboratory ..	2,803	1,028	335	-693	-67.4%
Chicago Operations Office	2,092	11,614	9,599	-2,015	-17.4%
Total, Chicago Operations Office	4,895	12,642	9,934	-2,708	-21.4%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Idaho Operations Office	17,261	5,446	384	-5,062	-92 9%
Nevada Operations Office	23,678	23,932	23,901	-31	-0 1%
Oak Ridge Operations Office					
Oak Ridge Operations Office	7,215	8,179	3,000	-5,179	-63.3%
Oak Ridge Y-12	437,631	413,591	374,221	-39,370	-9.5%
Oak Ridge Institute for Science and Education	14,126	12,487	12,687	200	1.6%
Oak Ridge National Laboratory	16,213	16,666	16,790	124	0.7%
Total, Oak Ridge Operations Office	475,185	450,923	406,698	-44,225	-9.8%
Oakland Operations					
Lawrence Livermore National Lab	52,446	58,021	49,083	-8,938	-15.4%
Oakland Operations Office	527	283	316	33	11 7%
Total, Oakland Operations Office	52,973	58,304	49,399	-8,905	-15.3%
Richland Operations Office					
Pacific Northwest National Lab	45,748	23,486	14,610	-8,876	0.0%
Richland Operations Office	1,094	287	358	71	24.7%
Total, Richland Operations Office	46,842	23,773	14,968	-8,805	-37.0%
Savannah River Operations Office					
Savannah River Operations Office	5,145	5,247	5,854	607	11.6%
Savannah River Westinghouse	149,735	150,190	127,686	-22,504	-15.0%
Total, Savannah River Operations Office	154,880	155,437	133,540	-21,897	-14.1%
Headquarters/Other	16,741	40,919	179,618	138,699	339 0%
Subtotal, Stockpile Management	2,041,087	2,052,554	1,998,300	-54,254	-2.6%
Prior Year Work Conducted in FY 1999		28,558	0	-28,558	-100.0%
Subtotal, Stockpile Management	2,041,087	2,081,112	1,998,300	-82,812	-4.0%
Use of Prior Year Balances	-1,870	-35,032	0	35,032	-100.0%
Total, Stockpile Management	2,039,217	2,046,080	1,998,300	-47,780	-2.3%

Site Description

Weapons Stockpile Management activities are conducted at four production facilities and three national laboratories. The production facilities include the Kansas City Plant-Kansas City, Missouri, operated by

Allied Signal Aerospace; the Pantex Plant-Amarillo, Texas, operated by Mason & Hanger; the Y-12 Plant-Oak Ridge, Tennessee, operated by Lockheed Martin Energy Systems; and the Savannah River Site-Aiken, South Carolina, operated by Westinghouse Savannah River Company. The national laboratories include Sandia National Laboratories-Albuquerque, New Mexico, and Livermore, California, operated by Lockheed Martin; Los Alamos National Laboratory-Los Alamos, New Mexico; and Lawrence Livermore National Laboratory-Livermore, California, operated by the University of California. Other miscellaneous locations are funded through the Weapons Stockpile Management Program as noted.

Kansas City Plant

The Kansas City Plant is located on 141 acres of the Bannister Federal Complex within the city limits of Kansas City, Missouri, about 12 miles south of downtown. The Kansas City Plant is the main facility in the nuclear weapons complex for the manufacture and procurement of nonnuclear components for nuclear weapons, including electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal. The broad range of components and devices procured from U.S. industry is supported by an extensive system to qualify suppliers and accept products.

The Kansas City Plant provides a broad range of standard industrial processes (e.g. plating, machining, metal deposition, molding, painting, heat treating, and welding), some of which are uniquely tailored to meet special weapon reliability requirements. Delivery of nonnuclear components for the B-61 Mod 11 was completed in 1997. The Kansas City Plant evaluates components and subsystems removed from the stockpile for reuse or testing. The plant is participating with the other plants and laboratories in the Enhanced Surveillance Program to predict component and material lifetimes, critical elements of the Stockpile Life Extension Program, and in Advanced Manufacturing, Design and Production Technologies (ADAPT) program to develop modular, scalable, and environmentally sound manufacturing processes.

Los Alamos National Laboratory

LANL is located on about 28,000 acres adjacent to the town of Los Alamos, New Mexico, which is approximately 25 miles northwest of Santa Fe. Specific LANL stockpile management activities include plutonium fabrication and processing technology development with support from the Lawrence Livermore National Laboratory (LLNL); oversight of tritium reservoir surveillance, testing, and tritium recycle technology; support of high explosive safety and assembly/disassembly operations at the Pantex Plant; detonator development and surveillance; beryllium fabrication; neutron tube target loading, and pit support component production and surveillance.

A plutonium pit manufacturing mission is being reestablished at LANL to replace units destructively tested in the surveillance program and to replace pits in the future should surveillance indicate a problem with a pit. DOE is instituting a phased approach to assure the capability to manufacture is retained and then to establish a capacity to manufacture a number of pits per year.

LANL also participates in the Enhanced Surveillance Program and the Dual Revalidation program.

LANL has a major role in DOE's backup technology for a new tritium production source. LANL directs the APT National Project Office which is responsible for the engineering, development and demonstration activities to verify technical issues and the preliminary design of the APT.

LANL's role in research and development is discussed further in the Stockpile Stewardship decision unit.

Pantex Plant

The Pantex Plant is located on approximately 10,177 acres about 17 miles northeast of Amarillo, Texas. Pantex is the only facility in the complex for quantity assembly/disassembly of nuclear weapons.

Plutonium pits from dismantled weapons are stored at Pantex. The site has been designated as the permanent location for strategic reserve pit storage and the interim storage location for surplus pits resulting from dismantlement activities and the planned closure of the Rocky Flats Site.

Pantex also fabricates high explosives used in nuclear weapons and performs modifications and surveillance of nuclear weapons scheduled to remain in the future stockpile.

Pantex is participating with the other plants and the laboratories in the Enhanced Surveillance Program and in Advanced Manufacturing, Design and Production Technologies (ADAPT). A five-year agreement with the State of Texas commits DOE to fund the Amarillo National Resource Center for Plutonium. FY 1999 is the last year funding is provided under the current agreement. DOE has received inquiries from the State requesting the extension of the agreement for another 5-year period.

Beginning in 1999, the assembly/disassembly and the high explosives fabrication facilities will be appropriately downsized to support the future stockpile. By approximately 2005, these facilities will be about two-thirds their current size. This downsizing will involve modifications and consolidations within the existing footprint.

Sandia National Laboratories

SNL is located on the 75,520-acre Kirtland Air Force Base military reservation about 6.5 miles east of downtown Albuquerque, New Mexico. It occupies about 18,000 acres on the Kirtland reservation and has additional facilities in Livermore, California, and in Tonopah, Nevada.

SNL is responsible for the nonnuclear components and systems engineering for all nuclear weapons and is a crucial point of contact with DoD in the areas of weapon requirements, system design, logistics, surveillance, training, and dismantlement. SNL manufactures certain nonnuclear components including neutron generators and is capable of providing an assured source of radiation hardened electronics.

SNL participates in the ADAPT program, the Enhanced Surveillance Program, and the Dual Revalidation program.

SNL's role in research and development is discussed further in the Stockpile Stewardship decision unit.

Nevada Operations Office

NTS encompasses approximately 867,000 acres in Nye county in southern Nevada, about 65 miles northwest of Las Vegas.

DOE's Nuclear Emergency Search Team, based at NTS, can respond to any type of emergency involving radioactive materials in the U.S. or abroad.

The Nevada Test Site role in Test Readiness and Experimentation is discussed in the Stockpile Stewardship decision unit.

Y-12 Plant

The Y-12 Plant is located on about 800 acres of the almost 35,000-acre Oak Ridge Reservation located about 20 miles west of Knoxville, Tennessee. Y-12 maintains the only capability in the nuclear weapons complex to fabricate quantity uranium and lithium components and parts for nuclear weapons, including secondaries and radiation cases. All current nuclear weapons have components produced at Y-12.

Y-12 has historically stored highly enriched uranium (HEU) and lithium for the nuclear weapons complex and Y-12 is now designated the permanent location for the storage of strategic reserves of these materials. Y-12 also evaluates components and subsystems returned from the stockpile, dismantles nuclear weapons secondaries returned from the stockpile and processes recovered special nuclear materials for storage.

Y-12 is participating with the other plants and the laboratories in the Enhanced Surveillance Program to predict component and material lifetimes, a critical element of the Stockpile Life Extension Program, and in the Advanced Manufacturing, Design and Production Technologies (ADAPT) program.

Lawrence Livermore National Laboratory

LLNL is located on about 821 acres in Livermore, California. A 7,000-acre auxiliary testing range is located about 18 miles east of the Livermore site. Along with participation in the Enhanced Surveillance Program, the Advanced Manufacturing, Design and Production Technologies (ADAPT) program, and the Dual Revalidation program, specific LLNL stockpile management activities include the support of high explosive safety and assembly/disassembly operations at the Pantex Plant, and oversight of uranium and case fabrication and processing technology with support from the Y-12 Plant and LANL.

LLNL's role in research and development is discussed further in the Stockpile Stewardship decision unit.

Savannah River Site

The Savannah River Site occupies approximately 198,000 acres about 12 miles south of Aiken, South Carolina on the state line with Georgia. Augusta, Georgia is about 16 miles northwest of the site. The primary DP mission at the Savannah River Site (SRS) is the recycling of tritium from the weapons stockpile and the loading and surveillance of tritium reservoirs.

SRS tritium facilities will be upgraded and consolidated to support the use of an existing commercial light water reactor (CLWR). A new tritium extraction facility will be constructed at SRS.

All Other Sites

Stockpile Management activities in support of the Tritium Source initiative are also conducted at the Pacific Northwest Laboratory and Chicago Operations Office. Safe and secure storage of excess U-233 under the Materials program takes place at the Oak Ridge National Laboratory. Radiological/Nuclear Accident Response activities are also conducted at the Oak Ridge Institute for Science and Education.

Core Stockpile Management

Mission Supporting Goals and Objectives

The Core Stockpile Management operations and maintenance program includes procurement of materials (exclusive of nuclear materials); fabrication and assembly of nuclear weapons and weapon components; lifetime surety, maintenance and reliability assessments of the enduring stockpile; weapon dismantlement and disposal; maintenance of a production capability; development and operation of safe, secure systems for transporting nuclear weapons and weapon components; preparation, issuance, and maintenance of field training manuals; and facility startup and standby operations.

Ongoing Activities

- Support the warhead dismantlement/disposal and storage program;
- Support modifications, repairs and retrofit programs;
- Support the limited life component exchange program;
- Provide quality evaluations, special testing, and surveillance of nuclear weapon systems;
- Acquire a pit rebuild capability and limited capacity to meet near-term stockpile requirements;
- Maintain and improve upon essential technologies and capabilities; and
- Maintain the weapons complex infrastructure at a level necessary to accomplish mission requirements.

Budget Contents

Core Stockpile Management operations and maintenance funding is broken into 14 major categories: **Stockpile Maintenance, Stockpile Evaluation, Dismantlement, Materials Recycle and Recovery, Storage, Transportation, Pit Production, Containers, Field Engineering, Training and Manuals, Complex Downsizing, Project Support/Facility Startup/Standby/D&D of Facilities, Special Projects and Other, Capital Equipment, and General Plant Projects.**

Stockpile Maintenance includes limited life component exchange, maintenance, and retrofit activities on various weapon systems in the enduring stockpile to maintain War Reserve weapons and components.

Stockpile Evaluation includes new material laboratory tests, new material flight tests, stockpile laboratory tests, stockpile flight tests, quality evaluations, special testing, and surveillance of weapon systems to ensure quality evaluation and assessment of the reliability of War Reserve weapons and components.

Dismantlement includes all activities for weapons associated with retirement, disassembly, component characterization, and disposal and reclamation of materials and components; the engineering, development, testing, certification, procurement, and refurbishment of containers required for interim storage; and the staging and storage of weapons, components, and materials awaiting dismantlement. In FY 1998, the Department has carried out a robust dismantlement program and disassembled 1,062

weapons, primarily consisting of the W69. The majority of W69 units were completed in FY 1998 with the residual units scheduled for completion in FY 1999.

Materials Recycle and Recovery includes the recycle and recovery of plutonium, enriched uranium, and tritium from fabrication and assembly operations, limited life components, and dismantlement of weapons and components. Involves the process in recycling and purifying the above materials to meet specifications for safe, secure, and environmentally acceptable storage, including meeting the directive schedule for tritium reservoir refills.

Storage provides for the cost of storage of weapons material or components to be stored for the foreseeable future. Does not include the cost of temporary storage of materials awaiting processing, staging for dismantlement, or any other interim storage.

Transportation provides for the safe, secure movement of nuclear weapons, strategic quantities of Special Nuclear Material, selected nonnuclear weapon components, and limited life components to and from military locations and between nuclear complex facilities within the continental United States. Supports the level of weapon deliveries and stockpile modifications specified in the Production and Planning Directive. Provides operational fleet vehicles and communications systems through repair and refurbishment, and modifications to enhance safety and security. This program element does not include the cost for the couriers and other administrative personnel (federal employees) who execute this program. These costs include federal employee salaries and benefits, travel, and training, and are funded in the Weapons Activities Program Direction decision unit.

Pit Production includes operating support and the procurement of equipment for the reestablishment of a war reserve pit production capability at LANL and the initiation of the manufacturing of quantity pits for certification and ultimate placement into the nuclear weapons stockpile.

Containers includes research and development, design, recertification and maintenance, off-site transportation certification of component containers in accordance with federal regulations, off-site transportation authorization of non-certifiable nuclear materials transportation configuration; test and evaluation, production/procurement, fielding and maintenance, and decontamination and disposal to provide adequate quantities of containers to support the nuclear weapons mission (transportation and storage).

Field Engineering, Training and Manuals includes costs incurred for technical training of military and contractor personnel participating in the Joint Task Group evaluations of new weapons prior to complete engineering release.

Complex Downsizing includes operating support of the construction projects to consolidate and downsize the weapons production complex. Activities include conceptual design, NEPA documentation, Preliminary Safety Analysis Reports, facilities acceptance, pre-operational readiness, component prebuilds, qualification and process prove-in, workforce restructuring, and facility shutdown.

Project Support/Facility Startup/Standby and Decontamination and Disposition of Facilities includes operating support of construction projects including conceptual design, NEPA documentation, Preliminary Safety Analysis Reports, facilities acceptance, pre-operational readiness, plant support costs during construction, activation and startup. Includes the cost of Enriched Uranium Operations at the Y-12 Plant. Also includes the cost of maintaining standby facilities for future use and the costs for decontamination and disposition of production equipment, facilities and, land.

Special Projects and Other includes programmatic activities coordinated and contracted through the Albuquerque, Oak Ridge, and Savannah River Operations Offices and Headquarters. These special projects, often one-time efforts or complex-wide efforts, do not fit easily into other budget categories and require special control or visibility. Funding is also includes funding responsive to the Department's Implementation Plan for the Defense Nuclear Facilities Safety Board recommendation 97-2 related to Nuclear Criticality.

Core Stockpile Management Construction

A detailed listing of individual construction line items follow. Further project justification can be found in the Construction Project Data Sheets which are included with this budget submission. No FY 2000 funding is being requested for Project 99-D-123, Replace Mechanical Utility Systems at the Y-12 Plant or for Project 99-D-125, Replace Boilers and Controls at the Kansas City Plant. These projects have been deferred to allow execution of Congressionally directed external assessment of these projects to be completed. Any recommendations related to the scope or schedule of these projects will be addressed in the FY 2001 budget submission. Additionally, no FY 2000 funding is being requested for project 97-D-122, Nuclear Materials Storage Facility Renovation at the Los Alamos National Laboratory. Questions regarding approach, design and costs remain. Answers to these questions and accompanying decision process are out of sync with the FY 2000 budget cycle. It is anticipated that additional information will be provided to Congress once a path forward is developed. Additional details on these changes are provided within the section titled, "Detailed Program Justification."

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations and Maintenance					
Stockpile Maintenance	457,146	551,162	552,692	1,530	0.3%
Stockpile Evaluation	250,554	243,074	271,218	28,144	11 6%
Dismantlement	92,109	64,179	41,232	-22,947	-35.8%
Material Recycle and Recovery	112,519	132,305	144,690	12,385	9.4%
Storage	88,454	98,517	101,086	2,569	2.6%
Transportation	64,465	63,800	60,000	-3,800	-6.0%
Pit Production	82,888	103,755	116,492	12,737	12.3%
Containers	21,880	27,414	25,756	-1,658	-6.0%
Field Engineering, Training & Manuals	6,364	5,700	5,900	200	3.5%
Complex Downsizing	34,347	21,850	26,788	4,938	22.6%
Project Support/Facility Startup/Standby/D&D	83,467	68,002	29,969	-38,033	-55.9%
Special Projects and Other	77,567	99,052	77,606	-21,446	-21.7%
Subtotal, Operating Expenses	1,371,760	1,478,810	1,453,429	-25,381	-1.7%
Capital Equipment	33,505	20,102	1,250	-18,852	-93 8%
General Plant Projects	13,558	23,842	2,642	-21,200	-88.9%
Subtotal, Operations and Maintenance	1,418,823	1,522,754	1,457,321	-65,433	-4.3%
Construction	83,370	97,658	94,679	-2,979	-3.1%
TOTAL, Core Stockpile Management	1,502,193	1,620,412	1,552,000	-68,412	-4.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Stockpile Maintenance			
■ Support Production and Planning Directive schedule for limited life component exchange consistent with START I and/or the ability to reactivate to START I	151,622	167,121	168,135

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Support weapons modifications, alterations and repairs in accordance with Production and Planning Directive schedule for the W87 Life Extension Program, B61 Alts 335 and 339, and the B83-1 Quality Improvement Program	305,524	384,041	384,557
Total, Stockpile Maintenance	457,146	551,162	552,692
Stockpile Evaluation			
■ Conduct new material laboratory tests/stockpile laboratory tests	69,499	65,214	73,782
■ Conduct new material flight tests/stockpile flight tests	112,705	100,497	117,346
■ Conduct surveillance testings	68,350	77,363	80,090
Total, Stockpile Evaluation	250,554	243,074	271,218
Dismantlement			
■ Disassembly of retired weapons	66,641	50,450	36,254
■ Characterization and disposition of components from dismantlement	14,772	1,198	1,334
■ Staging and storage of weapons, components or nuclear materials awaiting dismantlement.	10,696	12,531	3,644
Total, Dismantlement	92,109	64,179	41,232
Materials Recycle and Recovery			
■ Development and implementation of new processes or improvements to existing processes for fabrication and recovery operations for plutonium and uranium, and for material stabilization, conversion, and storage; and recycle and recovery of material from fabrication and assembly operations, limited life components, and dismantlement/disposal of weapons and components	86,170	97,901	108,970
■ Support for DNFSB recommendation 94-1 at LANL related to stabilization of uranium and plutonium residues	26,349	34,404	35,720
Total, Materials Recycle and Recovery	112,519	132,305	144,690

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Storage			
■ Storage of weapons material or components to be stored for the foreseeable future	88,454	98,517	101,086
Transportation			
■ Provide safe, secure movement of nuclear weapons, strategic quantities of Special Nuclear Material, selected nonnuclear weapon components, and limited life components to and from military locations and between nuclear complex facilities within the continental United States	16,175	16,965	17,160
■ Support activities necessary to improve or purchase new facilities or equipment; effect economies of operations; reduce or eliminate health, fire and security problems; and maintain, refurbish, and/or modify fleet equipment operations	36,955	34,835	29,880
■ Support activities to continually track and privately communicate with convoys	11,335	12,000	12,960
Total, Transportation	64,465	63,800	60,000
Pit Production			
■ Recapture the capability to build war reserve pits and achieve an annual production capacity of 20 pits per year by 2007	79,088	86,555	90,867
■ Replace in-kind equipment to address facility/system safety and reliability issues through the Transition Manufacturing and Safety Equipment Initiative	0	15,000	25,000
■ Preparatory efforts to support longer-term capacity requirements	3,800	2,200	625
Total, Pit Production	82,888	103,755	116,492

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Containers			
■ Research and development of transportation and storage containers	6,988	7,167	4,070
■ Recertification and maintenance of transportation and storage containers	7,479	4,774	5,803
■ Production/procurement of transportation and storage containers	7,413	15,473	15,883
Total, Containers	21,880	27,414	25,756
Field Engineering, Training and Manuals			
■ Technical training of military and contractor personnel participating in the Joint Task Group evaluations of new weapons prior to complete engineering release	6,364	5,700	5,900
Total, Field Engineering, Training and Manuals	6,364	5,700	5,900
Complex Downsizing			
■ Complete Nonnuclear Reconfiguration	22,438	1,092	0
■ Stockpile Management Restructuring Initiative-Kansas City Plant	2,196	5,499	8,155
■ Stockpile Management Restructuring Initiative-Pantex Plant	385	1,057	2,339
■ Stockpile Management Restructuring Initiative-Savannah River Site	3,297	2,300	2,700
■ Stockpile Management Restructuring Initiative-Y-12 Plant	6,031	11,902	13,594
Total, Complex Downsizing	34,347	21,850	26,788
Project Support/Facility Startup/Standby and Decontamination and Disposition of Facilities			
■ Operating support of construction projects	20,554	32,804	22,836
■ Enriched Uranium Operations at the Y-12 Plant	60,648	30,035	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Maintaining standby facilities for future use and decontamination and disposition of production equipment, facilities and land	2,265	5,163	7,133
Total, Project Support/Facility Startup/Standby and Decontamination and Disposition of Facilities	83,467	68,002	29,969
Special Projects and Other			
■ Items at Headquarters/Other include nuclear criticality, Defense Programs Analysis Group, Amarillo National Resource Center for Plutonium, and Environmental Surety	16,535	50,454	40,257
■ Items at the Albuquerque Operations Office include support for aviation services, radiation effects research, support for environmental impact statements, and other complex-wide efforts	2,118	9,633	11,226
■ Funding at the Oak Ridge Operations Office provides support for resumption activities and manufacturing process and stockpile support systems at the Y-12 Plant	52,177	33,389	20,269
■ Funding at the Savannah River Operations Office provides for Safeguards and Security Costs for the Tritium area at the Savannah River Site and for other activities that provide direct programmatic support	6,737	5,576	5,854
Total, Special Projects and Other	77,567	99,052	77,606
Capital Equipment			
■ Capital equipment is required by the four production plants and three weapons laboratories to maintain the capabilities necessary for stockpile maintenance, stockpile evaluation, and dismantlement activities.	33,505	20,102	1,250

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
General Plant Projects			
■ General Plant Projects provide funding for low cost construction projects (less than $5 million) required to maintain the infrastructure and ongoing Stockpile Management programs of the four production plants and the three weapons laboratories.	13,558	23,842	2,642
Construction			
■ See "Capital Operating Expenses and Construction Summary" for details	83,370	97,658	94,679
Total, Core Stockpile Management	1,502,193	1,620,412	1,552,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Stockpile Maintenance	
■ FY 1999 and FY 2000 funding for LLCE component support is largely driven by production costs for the W76 neutron generator which is scheduled for delivery in October 1999	+1,014
■ FY 1999 and FY 2000 funding for stockpile refurbishment is driven by schedules to meet the first delivery unit (FDU) for the W87 Life Extension Program in December 1998 and ramp up to steady state production	+15,948
■ Other refurbishment efforts during the FY 1998-FY 2000 time frame include the B61 Alts 335 and 339, and the B83-1 Quality Improvement Program	-15,432
Total, Stockpile Maintenance	+ 1,530
Stockpile Evaluation	
■ Increase is driven by lab test and flight test requirements for the W76, W87 and W88 and doubling up of B-61 testing to meet schedule requirements associated with the expiration of the Nuclear Explosive Safety Study	+28,144

	FY 2000 vs. FY 1999 ($000)
Dismantlement	
■ This decrease reflects workload efficiencies, few start-ups, and reduced costs associated with staging of warheads. FY 1999 efforts will focus on completion of the W69 and ramp-up of the W79 and W56 for projected dismantlements of approximately 275 weapons. In FY 2000, dismantlement is scheduled to begin on the B53 and continue on the W56 and W79, for projected dismantlement of approximately 375 weapons	-22,947
Materials Recycle and Recovery	
■ This increase of about 10 percent is reflected at the Y-12 Plant. Funding requirements for this category increase as Enriched Uranium Operations are resumed. This is driven by operation of the recovery furnace in Building 9206 and the production of enriched uranium buttons to support casting needs	+12,385
Storage	
■ This 2.6 percent increase is reflected at the Y-12 Plant and is driven by the development and implementation of storage technologies to improve nuclear materials accountability in storage and processing facilities, and storage area modifications to enable the Plant to meet its dismantlement mission	+2,569
Transportation	
■ The decrease of $3.8 million is driven by reduced funding requirements for the SafeGuards Transporter. While deliveries for FY 1999 and FY 2000 are constant (six per year), funding decreases because of the inclusion of long-lead procurement in the FY 1999 program	-3,800
Pit Production	
■ Funding for Transition Manufacturing and Safety Equipment needed for building the W88 pit and meeting the FY 2001 stockpile delivery commitment, and continued safe facility operations	+10,000
■ Efforts to continue the recapture of required technologies for the W88, B61-7, and W87 and fabrication of W88 pits for certification and qualification will continue with the goal of providing war-reserve pits for the stockpile in 2001	+2,737
Total Funding Change, Pit Production	+12,737

	FY 2000 vs. FY 1999 ($000)
Containers	
■ Funding for containers reflects a decrease of about 6 percent over the FY 1999 level which is driven by the completion of the design efforts and the reduced repackaging effort associated with the AL-R8 Sealed Insert Upgrade. The Department has been conducting R&D efforts on this container as an option for long-term storage of pits and will complete the design review in FY 1999	-1,658
Field Engineering, Training and Manuals	
■ There is no significant change between the two years in this category	+200
Complex Downsizing	
■ FY 2000 funding for Complex Downsizing increases by about 23 percent over the FY 1999 level driven by increases in operating support of the Stockpile Management Restructuring Initiative at the Kansas City and Y-12 Plants	+4,938
Project Support/Facility Startup/Standby and Decontamination and Disposition of Facilities	
■ The $35 million decrease from FY 1999 is largely driven by the completion of Enriched Uranium Operations Process Based Restart at the Y-12 Plant in FY 1999..	-30,035
■ There are also decreased requirements for construction project support at the Pantex Plant	-7,998
Total Funding Change, Project Support/Facility Startup/Standby and Decontamination and Disposition of Facilities	-38,033
Special Projects and Other	
■ Reduced funding for Environmental Surety efforts at INEEL and other special projects	-3,326
■ Completion of cooperative agreement with the state of Texas for funding of the Amarillo National Resource Center for Plutonium	-5,000
■ Termination of contractor support to the Oak Ridge Operations Office supporting Enriched Uranium Operations process based restart and reduced funding for manufacturing process and stockpile support systems at the Y-12 Plant	-13,120
Total, Special Projects and Other	-21,446

	FY 2000 vs. FY 1999 ($000)
Capital Operating Expenses and General Plant Projects	
■ The decrease from FY 1999 is driven by the nonrecurring Congressional add-on for infrastructure and maintenance needs in FY 1999	-40,052
Core Stockpile Management Construction	
■ The decrease is driven by the deferral of FY 1999 to allow execution of Congressionally directed external assessment of thee projects to be completed. Additionally, no FY 2000 funding has been requested for the Nuclear Materials Storage Facility Renovation. Questions regarding approach, design and cost remain. These decreases are partially offset by an increase for the CMR Upgrade Project	-2,979
Total Funding Change, Core Stockpile Management	-68,412

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

Core Management	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	33,505	20,102	1,250	-18,852	-93.8%
General Plant Projects	13,558	23,842	2,642	-21,200	-88.9%
Total, Capital Operating Expenses	47,063	43,944	3,892	-40,052	-91.1%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
99-D-132, Nuclear Materials S&S Upgrades Project, LANL	60,746	0	0	9,700	11,300	39,746
99-D-128, SMRI, Pantex Consolidation	13,218	0	0	1,108	3,429	8,681
99-D-127, SMRI, Kansas City Plant II	119,500	0	0	13,700	17,000	88,800
99-D-125, Replace Boilers & Controls, KCP	14,000	0	0	1,000	0	13,000
99-D-123, Replace Mechanical Utility Systems, Y-12 Plant	4,330	0	0	1,900	0	2,430
99-D-122, Rapid Reactivation, VL	22,900	0	0	11,200	11,700	0
98-D-124, SMRI, Y-12 Consolidation	24,800	0	6,450	10,700	3,150	4,500
98-D-123, SMRI, Tritium Facility Modernization & Consolidation, SR	98,400	0	11,000	27,500	21,800	38,100
97-D-124, Steam Plant Waste Water Treatment Facility Upgrade, Y-12	2,500	600	1,900	0	0	0
97-D-123, Structural Upgrades, KCP	18,000	1,400	0	6,400	4,800	5,400
97-D-122, Nuclear Materials Storage Facility Renovation, LANL	22,364	4,000	9,200	2,500	0	6,664
96-D-123, Retrofit HVAC and Chillers, Y-12	12,800	10,100	2,700	0	0	0
96-D-122, Sewage Treatment Quality Upgrade, PX	11,300	700	6,900	3,700	0	0
95-D-122, Sanitary Sewer Upgrade, Y12	32,000	19,400	12,600	0	0	0
95-D-102, CMR Upgrades, LANL	174,100	67,740	5,000	5,000	18,000	78,360

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
94-D-125, Upgrade Life Safety, KCP ..	14,700	12,700	2,000	0	0	0
94-D-124, Hydrogen Fluoride Supply System, Y-12 Plant	26,300	24,900	1,400	0	0	0
93-D-122, Life Safety Upgrades, Y-12 .	29,200	23,850	2,100	3,250	0	0
92-D-126, Replace Emergency Notification Systems, VL	28,800	17,100	3,200	0	0	8,500
88-D-123, Security Enhancements Project, PX	131,200	125,000	0	0	3,500	2,700
88-D-122, Facilities Capability Assurance Program, VL	398,724	379,804	18,920	0	0	0
Total, Construction			83,370	97,658	94,679	296,881

Major Items of Equipment *(TEC $2 Million or Greater)*

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
Replacement Aircraft	13,000	0	0	13,000	0	FY 1999
O-Wing Primary Mill Electrical Upgrade	3,500	0	0	3,500	0	FY 2000
Total, Major Items of Equipment		0	0	16,500	0	

Enhanced Surveillance

Mission Supporting Goals and Objectives

The Enhanced Surveillance Program is a complex-wide initiative developing predictive measures to address the maintenance needs of the stockpile. The basic goals of the enhanced surveillance program are to predict defects that might occur in the enduring stockpile due to aging or other reasons, to develop a means to assess safety and reliability impacts, and to ensure problems are corrected before they reduce safety or reliability. Enhanced surveillance techniques will extend capabilities to predict the effects of materials aging on components and weapons performance, to determine which components are liable to fail, and to estimate failure dates. Successful completion of key activities under this 5-7 year program will provide the diagnostic tools and data essential to advance warning of stockpile defects and essential to Stockpile Life Extension Program planning. The Enhanced Surveillance Program will build upon existing Defense Programs' research and development, testing (nonnuclear), and stockpile evaluations/surveillance activities and will develop new predictive models, new techniques for data analysis, and may eventually lead to in-situ, real-time, non-destructive monitoring for warheads. The Enhanced Surveillance Program Plan issued by Headquarters and updated on an annual basis includes 10 focus areas consisting of tasks with detailed schedules, milestones, and deliverables. Each task description also includes site participants, required site funding, risk assessment, and discussion of leveraged work funded through other sources.

Ongoing Activities

- Adhering to schedules in the Enhanced Surveillance Program (ESP) Plan for activities that enhance knowledge of weapon-relevant physical processes affecting aging and operation of weapon components.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Enhanced Surveillance	48,714	81,511	85,290	3,779	4.6%
Total, Enhanced Surveillance	48,714	81,511	85,290	3,779	4.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Delivery of diagnostic tools for surveillance of nuclear components	14,736	25,447	22,617
■ Delivery of diagnostic tools for surveillance of nonnuclear components	11,508	19,020	23,366
■ Delivery of predictive capabilities for nuclear components	13,170	20,858	17,989
■ Delivery of predictive capabilities for nonnuclear components	9,300	16,186	21,318
Total, Enhanced Surveillance	48,714	81,511	85,290

Explanation of Funding Changes from 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ Increase reflects transitioning of laboratory demonstrated tools into plant operations and the acceleration of research vital to providing SLEP with data upon which to base stockpile retrofit decisions, especially for the W76 and W80 warheads	+3,779
Total Funding Change, Enhanced Surveillance	+3,779

Advanced Manufacturing, Design & Production Technologies

Mission Supporting Goals and Objectives

The goal of the Advanced Manufacturing, Design and Production Technologies initiative is to reengineer the weapons complex product realization capabilities and support the Stockpile Life Extension Program by developing, validating, and implementing advanced tools, manufacturing processes, and practices needed to design, develop, and fabricate nuclear weapons systems and components of improved quality at reduced cost. The application of advanced manufacturing technologies will radically change the way the DOE designs, builds, and test systems and components by infusing new product and process technology and adopting modern business and engineering practices. ADAPT is the Defense Programs' vehicle for improving product realization within a downsized enterprise. ADAPT cuts across all levels of process and product development from the manufacture of materials to the integration of thousands of parts into a weapon. The requirements and objectives for the ADAPT Program and other advanced manufacturing programs are set forth in the Stockpile Stewardship Plan (Green Book) and are further refined in the ADAPT Master Plan. Major long term goals include the reduction of the occurrence of design and manufacturing defects in replacement hardware by a factor of ten and the reduction of the time and cost required to realize these products by a factor of two.

The ADAPT program has four elements:

- Enterprise Integration (EI), which provides new and improved information tools for DOE nuclear weapons design and manufacturing activities;
- Integrated Product and Process Design (IPPD)/Agile Manufacturing(AM), which develops and deploys new design and manufacturing capabilities;
- Process Development (PD), which develops and implement new production processes and continuously improves existing processes; and
- Hedge Technologies (HT), which performs development activities to prepare to respond to possible contingencies.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Advanced Manufacturing, Design and Production Technologies	90,098	79,520	85,000	5,480	6.9%
Total, Advanced Manufacturing, Design and Production Technologies	90,098	79,520	85,000	5,480	6.9%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Process Development	47,593	42,709	41,750
■ Enterprise Integration	19,500	17,399	17,350
■ IPPD/Agile Manufacturing	22,084	19,012	25,150
■ Hedge Technologies	921	400	750
Total, ADAPT	90,098	79,520	85,000

Explanation of Funding Changes from 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ In Enterprise Integration, both the Integrated Production Scheduling System (IPSS) and the Enterprise Modeling (EM) efforts will receive additional funding. The IPSS will complete a first prototype in the 3rd quarter of FY 1999 and the EM user's environment will be completed in the 4th quarter of FY 1999. Development of these tools is being accelerated so that they will be available to support outyear Stockpile Life Extension Program (SLEP) refurbishment schedules.	-49
■ In IPPD/Agile Manufacturing, the increase will be applied to continued accelerated development, installation and evaluation of the Production Realization Environment and collaboration tools and databases to support the ongoing development projects to ensure availability of key tools and processes on schedules dictated by SLEP.	+6,138
■ In process development, funding will be used to further develop processes needed to support emerging SLEP activities.	-959
■ The increase for Hedge Technologies in FY 2000 reflects continued work on preconceptual design planning for Rapid Reconstitution of Pit Production.	+350
Total Funding Change, ADAPT	+5,480

Radiological/Nuclear Accident Program

Mission Supporting Goals and Objectives

The Radiological\Nuclear Accident Program provides the capability for DOE to immediately respond to radiological accidents/incidents worldwide. This program provides overall program management and organizational structure during both emergency and non-emergency conditions for the personnel, equipment, and activities that collectively comprise the response capability. The emergency response assets are staffed primarily by engineers, scientists, and other technical personnel from the national laboratories, production facilities, and other DOE management and operating contractors supporting the nuclear weapons complex. The funding for this program is allocated to 15 nation-wide Department locations with the Nevada and Albuquerque Operations Offices, and the Los Alamos (LANL), Lawrence Livermore (LLNL), and Sandia National Laboratories (SNL) receiving the majority of the funding.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Radiological/Nuclear Accident Response	78,808	76,200	77,600	+1,400	0.0%
Total, Radiological Nuclear Accident Response	78,808	76,200	77,600	+1,400	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Nuclear Emergency Search Team			
■ Provides the U.S. Government's technical response to an act of nuclear terrorism. NEST is directed by DOE Headquarters and utilizes the expertise throughout the weapons complex, i.e., LANL, LLNL, SNL, Nevada Operations Office, Oak Ridge Institute for Science and Technology, and the Pantex plant.	44,511	43,816	45,239
Federal Radiological Monitoring and Assessment Center			
■ FRMAC is a single source of compiled and quality controlled radiological monitoring and assessment data for any federal agency, State, Tribal or local authority involved in resolving a radiological incident. FRMAC is managed by the Nevada Operations Office.	1,579	1,217	1,217
Atmospheric Release Advisory Capability			
■ ARAC, located at LLNL, provides rapid predictions and projections of the dosage and amount of radio nuclides potentially transported, diffused and/or deposited into the atmosphere and the resulting impact on people and the environment.	6,838	5,701	4,846
Aerial Measurement System			
■ (AMS) located at the Nevada Operations Office, is an aerial detection system capable of measuring gamma radiation for locating and tracking airborne radiation	10,120	9,980	9,980
Accident Response Group			
■ ARG is responsible for the resolution of accidents or significant incidents involving U.S. nuclear weapons. ARG is managed by the Albuquerque Operations Office.	12,412	12,084	12,084

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Radiological Emergency Assistance Center/Training Site			
■ REAC/TS, located in Oak Ridge, provides medical advice, specialized training, and on-site assistance, in the treatment of all types of radiation exposure accidents	994	974	1,174
Radiological Assistance Program			
■ RAP provides a local capability and first response to request for assistance during a radiological accident or incident. There are eight RAP regions: Brookhaven Area Office, Oak Ridge Operations Office, Savannah River Operations Office, Albuquerque Operations Office, Chicago Operations Office, Idaho Operations Office, Oakland Operations Office, and the Richland Operations Office.	2,354	2,288	2,860
Special Applications			
■ Provides for classified activities and exercises associated with the seven emergency response assets; includes costs associated with Technical integration activities that are crosscutting to the emergency response assets, and contractor support to achieve projected objectives related to the NEST and ARG activities	0	140	200
Total, Radiological/Nuclear Accident Response	78,808	76,200	77,600

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ The increase in the FY 2000 funding level will ensure that all activities will be maintained at the current readiness level for all assets	+1,400
Total Funding Change, Radiological/Nuclear Accident Response	+1,400

Tritium Source

Mission Supporting Goals and Objectives

On December 5, 1995, DOE issued a Tritium Supply and Recycling Record of Decision (ROD), that selected the two most promising alternative technologies for tritium production and established a dual-track strategy that would, within 3 years, select one of those technologies to become the primary tritium supply technology. The other technology, if feasible would be developed as a backup tritium source. Under the dual-track strategy, DOE would: 1) initiate the purchase of an existing commercial reactor (operating or partially complete) or irradiation build, and test critical components of an accelerator system for tritium production. Any new facilities that might be required, the production-scale accelerator and a Tritium Extraction Facility to support the commercial reactor alternative, would be constructed at DOE's Savannah River Site in South Carolina. The ROD also stated that DOE's Fast Flux Test Facility at the Hanford Reservation in Washington would be examined for a possible tritium production role although it had been previously rejected as a reasonable alternative.

On December 22, 1998, the Secretary of Energy announced his decision to select the use of commercial light water reactors for tritium production. The preferred reactors are the Watts Bar reactor and Sequoyah reactors located in Tennessee. Each of these reactors is operated by the Tennessee Valley Authority, an independent government agency. The linear accelerator option was designated a "backup" technology. The Fast Flux Test Facility will have no tritium production role. This ROD revises the December 1995 Tritium Supply and Recycling Record of Decision and completes the process of selecting a single technology for tritium production.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operating Expenses					
Accelerator Production of Tritium	131,251	85,000	57,000	-28,000	-32.9%
Light Water Reactor Target Development	52,089	56,000	49,000	-7,000	-12.5%
Total, Operating Expenses	183,340	141,000	106,000	-35,000	-24.8%
Construction					
Construction, APT	67,865	20,000	31,000	+11,000	+55.0%
Construction, CLWR	9,650	6,000	33,000	+27,000	+450.0%
Total, Construction	77,515	26,000	64,000	+38,000	+146.2%
Total, New Tritium Source	260,855	167,000	170,000	+3,000	+1.8%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Accelerator Production of Tritium (Operations & Maintenance)			
■ Development and demonstration of key components of the linear accelerator and target/blanket technologies. Development activities include demonstration of integrated high-power operation of the Low Energy Demonstration Accelerator, fabrication and high-field testing of a prototypic superconducting radio-frequency cryomodule and high-power couplers, materials performance analysis, target/blanket development, and validation of neutron and tritium production codes	131,251	85,000	57,000
Commercial Light Water Reactor (Operations & Maintenance)			
■ Continue the Tritium Producing Burnable Absorber Rod (TPBAR) Technology which will include: transfer designer-of-record activities to manufacturer, establish TPBAR manufacturing processes, conduct Lead Test Assembly destructive tests, complete component performance tests, procurement of long-lead materials for fabrication of TPBAR, award contract for long-term transportation, develop TPBAR handling processes and procedures, submit requests to the Nuclear Regulatory Commission to amend Watts Bar and Sequoyah reactor operating licenses	52,089	56,000	49,000
Accelerator Production of Tritium (Construction)			
■ Continue preliminary design of the accelerator, target/ blanket, tritium separation, and balance of plant facilities. During preliminary design, design packages will be developed for each major facility subsystem and prototype design will be completed for a few key items that would be needed early in construction should APT be activated as the primary tritium production source.	67,865	20,000	31,000

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Commercial Light Water Reactor (Construction)			
■ Begin detailed design (Title II) of the Tritium Extraction Facility and begin site preparation	9,650	6,000	33,000
Total, Tritium Source	260,855	167,000	170,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ The FY 2000 budget request includes $170.0 million, $3 million increase over the FY 1999 request, to begin site preparation for construction of the Tritium Extraction Facility at the Savannah River Site and continue preliminary design of essential elements of the APT	+3,000
Total Funding Change, Tritium Source	+3,000

Materials

Mission Supporting Goals and Objectives

Congress, in the FY 1998 Energy & Water Appropriations Act, transferred responsibility for DP materials at the Rocky Flats Environmental Technology Site and the Fernald Environmental Management Project (FEMP) to the Office of Environmental Restoration and Waste Management (EM) in order to simplify the management issues associated with environmental restoration activities at these sites. Consistent with this action by Congress, the Department (in FY 1999) transferred management and funding responsibility for materials at remaining EM-landlord locations from Defense Programs to EM (Idaho, Richland, and Savannah River). DP retains ownership of national security materials. Also included in the transfer are certain neutron source disposition activities at LANL.

Beginning in FY 1999, the Materials program supports only programmatic activities that include: the operation of Building 9206 at Y-12 Plant until phaseout and transfer to Building 9212; decontamination and refinement of surplus precious metals; operation of U-233 Storage and Distribution Center at ORNL; the recovery of materials from irradiated targets and the manufacture of radiation sources for Defense Programs and for other federal civilian and defense activities at the ORNL Radiochemical Engineering Development Center; and the processing of highly enriched uranium scrap from across the DOE complex to improve the accuracy of measurements, to allow for increased efficiencies in storing the materials, and to allow for other beneficial uses of the materials.

Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Materials	60,419	27,911	28,410	499	1.8%
Total, Materials	60,419	27,911	28,410	499	1.8%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Maintain safe, secure compliant storage of DP nuclear material at EM-landlord sites (transfer in FY 1999)	33,116	0	0
Excess Nuclear Materials Management & Storage	2,187	2,602	1,851
Special Chemical Operations	2,771	4,093	3,593
Process Pu-239/Be sources	1,881	0	0
Processing of Nuclear Materials	2,569	3,176	3,176
U-233 Storage and Distribution	9,158	10,615	12,100
Californium Industrial Sales/Loan	1,500	1,466	1,500
MK 42 Processing (Pu-242)	4,237	4,209	3,190
Uranium Scrap Recovery/Commercial Facilities	3,000	1,750	3,000
Total, Materials	60,419	27,911	28,410

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ FY 2000 reflects an increase in U-233 Storage and Distribution in order to meet the Secretary's commitment to DNFSB Recommendation 97-1, Safe Storage of Uranium-233	+499
Total Funding Change, Materials	+499

Stockpile Management

Construction Project Data Sheets

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99-D-122, Rapid Reactivation, Various Locations

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Total Estimated Cost has decreased $4,100,000 to $22,900,000 and the Total Project Cost has decreased $3,925,000 to $29,852,000 as a result of the descoping of certain production equipment from this line item and inclusion of FY 1997 and FY 1998 operating activities.
- Project start date has slipped six months due to delay in release of FY 1999 funds. Funding is being withheld pending completion of Congressionally mandated external reviews.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	Various [a]	3Q 1999 [a]	4Q 2001	27,000	33,777
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	Various [a]	1Q 2000 [a]	4Q 2001	22,900	29,852 [b]

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	11,200	11,200	6,900
2000	11,700	11,700	9,600
2001	0	0	6,400

[a] Project activities will be coordinated and phased with ongoing facility operations at SNL, KCP, and LANL; most equipment requirements are drawn from reuse of preexisting equipment specifications developed for Non-Nuclear Reconfiguration (NNR).

[b] Descoping of production equipment at Kansas City Plant results in a reduction to total estimated cost and total project cost of $4,100,000. Inclusion of FY 1997 and FY 1998 operating activities results in a $175,000 increase in total project costs.

3. Project Description, Justification and Scope

The FY 1993 Nonnuclear Reconfiguration Project (NNR), Project Number 93-D-123, was initiated to downsize the nonnuclear manufacturing component of the nuclear weapons complex while maintaining production capacities at a certain level. The reservoir production mission was transferred to the Kansas City Plant (KCP), the neutron generator production mission was transferred to the Sandia National Laboratories (SNL), and the neutron tube target loading mission was transferred to the Los Alamos National Laboratory (LANL). The production capacity for the reconfigured production complex was based upon a START II requirement base for decreased stockpile levels, but production capacities were not impacted. Subsequent direction has required the production complex to support a START II stockpile level while protecting the capability of reconstituting back to a START I level, referred to as START II with Hedge. As a result, the KCP, SNL, and LANL submitted plans and budget requirements to acquire the increased capacity necessary to support reconstitution of START I (START II with Hedge) levels.

The existing nuclear weapons complex was scoped under NNR using START II as criteria for equipment and facility requirements. This project will increase the complex's capability to protect START I (START II with Hedge) requirements. Minor facility modification and additional equipment is required, and therefore, included under this line item, to increase capacity to provide START I (START II with Hedge) requirements.

Rapid Reactivation will make use of the FY 1993 NNR Project Development, planning and management tools and documentation to the greatest extent practical. Rapid Reactivation activities for the Los Alamos and Kansas City subprojects are within the activity envelope of the Environmental Assessment conducted for nonnuclear manufacturing consolidation, which resulted in a Finding of No Significant Impact. The SNL requires preparation of an Environmental Assessment, which will be completed in FY 1999. All existing environmental and safety documentation will be appropriately reviewed for currency and adequacy, updated as required.

Rapid Reactivation requirements necessitate scope of work activities as follows: (1) The LANL subproject consists of designing, constructing, and installing a third target loader within the existing space of the Neutron Tube Target Loading facility (NTTL); (2) The Kansas City Plant subproject consists of rearranging existing space in, and adding additional space to, the current Reservoir Assembly Facility, and the procurement of additional production/process equipment; and (3) the SNL subproject consists of rearranging existing space within Building 870, adding additional space to adjacent buildings, and the procurement of additional production equipment.

Incorporation of these product line enhancements into KCP, SNL, and LANL facilities will be accomplished by rearranging and upgrading space within existing buildings, purchasing new product equipment, installation of some of the transferred and new equipment and associated support systems. Due to production schedules and other time constraints, interim equipment staging and testing may precede final equipment placement and the capital interim activities associated with final placement.

Sandia National Laboratories: Neutron Generators Facilities (NGF): TEC - $15,600,000

TEC	Previous	FY 1999	FY 2000	Outyear	Construction Start-Completion Dates
$15,600	$ 0	$ 5,630 [c]	$9,970 [c]	$ 0	3Q 1999 - 4Q 2001

The SNL subproject consists of rearranging existing space within Building 870, adding additional space to adjacent buildings, and the procurement of additional production equipment.

Kansas City Plant: Reservoir Assemblies and Testing: TEC - $4,400,000

TEC	Previous	FY 1999	FY 2000	Outyear	Construction Start-Completion Dates
$ 4,400 [d]	$ 0	$ 4,400	$ 0	$ 0	3Q 1999 - 4Q 2000

The Kansas City Plant subproject consists of rearranging existing space in, and adding additional space to, the current Reservoir Assembly Facility, and the procurement of additional production/process equipment.

Los Alamos National Laboratory: Neutron Tube Target Loading: TEC - $2,900,000

TEC	Previous	FY 1999	FY 2000	Outyear	Construction Start-Completion Dates
$ 2,900	$ 0	$ 1,170	$1,730	$ 0	3Q 1999 - 4Q 2000

The LANL subproject consists of designing, constructing, and installing a third target loader within the existing space of the Neutron Tube Target Loading facility (NTTL).

Project Milestones

FY 1999: Title I/II design complete; initiate procurement and construction.

FY 2000: Continue procurement; continue installation and complete physical construction at Los Alamos National Laboratory and the Kansas City Plant.

[c] FY 1999 subproject funding increased (FY 2000 correspondingly decreased) to reflect priorities given removal of high priority Kansas City Plant equipment scope.

[d] Subproject TEC reduced as a result of descoping certain production equipment from this line item, based upon receipt of $4,000,000 FY 1998 Congressional add-on funding for equipment procurement.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	731	731
Design Management Costs (0.8% of TEC)	190	190
Project Management Costs (0.4% of TEC)	94	94
Total Design Costs (4.4% of TEC)	1,015	1,015
Construction Phase		
Buildings	5,303	5,303
Special Equipment	7,428	7,428
Standard Equipment	4,230	7,400
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	1,010	1,010
Construction Management (2.1% of TEC)	475	475
Project Management (1.1% of TEC)	261	261
Total Construction Costs (81.7% of TEC)	18,707	21,877
Contingencies		
Design Phase (0.7% of TEC)	157	160
Construction Phase (13.2% of TEC)	3,021	3,948
Total Contingencies (13.9% of TEC)	3,178	4,108
Total, Line Item Costs (TEC) [e]	22,900	27,000

5. Method of Performance

Design and inspection shall be performed under a negotiated architect-engineering contract. Construction and procurement shall be accomplished by fixed-price contracts awarded after competitive proposals and administered by the DOE and Contractor staff. However, operating contractor personnel may perform design and construction roles for activities determined to be cost effective. Procurement of standard equipment will be administered by the DOE and Contractor staff on the basis of competitive proposals.

[e] Escalation rates taken from the FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	1,172	0	0	0	1,172
Construction	0	0	5,728	9,600	6,400	0	21,728
Total facility costs (Federal and Non-Federal)	0	0	6,900	9,600	6,400	0	22,900
Other project costs							
Conceptual design cost	100	0	0	0	0	0	100
NEPA documentation costs	0	25	50	0	0	0	75
Other project-related costs	0	0	2,547	2,440	1,790	0	6,777
Total other project costs	100	25	2,597	2,440	1,790	0	6,952
Total Project Cost (TPC)	100	25	9,497	12,040	8,190	0	29,852

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–30 years)		
Total related annual funding (operating from FY 2001 through FY 2030) [f]	0	0

[f] Activities will principally reside within the footprint of existing facilities.

99-D-127, Stockpile Management Restructuring Initiative—Kansas City Plant, Kansas City, Missouri

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

The Total Estimated Cost (TEC) has decreased from $122.5 million to $119.5 million and the Total Project Cost (TPC) has increased from $139.5 million to $139.7 million. The reduction in TEC is due to compressing the schedule from seven years to six years, thereby reducing escalation, and incorporating changes in scope. Scope changes include deletion of the West Data Center relocation and F-Aisle modification project, the addition of a downsized cafeteria relocation and the addition of equipment procurement to replace heat treat equipment unlikely to survive relocation.

The increase in TPC is the result of including an additional $3.2 million for equipment engineers that was pointed out in the project's independent assessment.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	2Q 2004 [a]	3Q 1999	3Q 2006	122,500	139,500
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1999	3Q 2004	3Q 1999	2Q 2005	119,500	139,700

[a] The work packages will be phased as required to maintain production operations. Title I design, Title II design and construction of work packages occur simultaneously after 3rd Qtr. FY 1999.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	13,700	13,700	9,725
2000	17,000	17,000	18,139
2001	29,200	29,200	24,529
2002	31,300	31,300	32,901
2003	14,000	14,000	17,999
2004	14,300	14,300	16,131
2005	0	0	76

3. Project Description, Justification and Scope

The end of the Cold War radically changed the defense posture of the United States, calling for significant changes and reductions in nuclear weapons complex structure and operations. The initial phase of this retrenchment began when the Department of Energy (DOE) decided to cease nonnuclear production at three plants and consolidate most of its nonnuclear manufacturing at the Kansas City Plant. However, even with the influx of new missions, the downturn in defense production meant continued reductions in operating costs and work force.

The Stockpile Management Restructuring Initiative provides a cost-effective plan that capitalizes on the Kansas City Plant's logistic and manufacturing expertise to ensure quality nonnuclear products through the year 2010 and beyond. Furthermore, the initiative minimizes DOE costs in the near term by lessening risks and reducing operating expenditures concurrent with capital investments. It also provides the technical capability, production capacity, and flexibility necessary to allow the Kansas City Plant to support scheduled nonnuclear production and a wide range of unanticipated production requirements, confidently and effectively.

The Stockpile Management Restructuring Initiative will allow the Kansas City Plant's infrastructure to be altered and greatly reduced from the current plant profile, substantially reducing costs to operate the Kansas City Plant. The restructuring initiative consists of changing the existing plant and operational approach in four major aspects: 1) physically reducing the size of the facility, 2) changing the approach to manufacturing from product-based to process-based, 3) reducing the support infrastructure appropriate for the right-sized operation, and 4) further streamlining the organizational structure to focus directly on the core manufacturing mission.

Currently, the Kansas City Plant consists of approximately 3.2 million square feet of floor space contained in three connected buildings: the main building, the manufacturing support building (MSB) and the technology transfer center (TTC). Approximately 3 million square feet of floor space is core stockpile management funded. Much of the floor space is underutilized and costly to maintain. The Kansas City Plant will be rearranged into three business units and a support operations business unit to bring about an overall reduction in total managed floor space, streamline operations, and produce

increased long-term operating efficiencies in manufacturing processes. The approximate square footage of each business unit after consolidation is as follows:

	Square Ft.
Electrical Products Business Unit	236,000
Mechanical Business Unit	350,000
Engineered Materials Business Unit	198,000
Support Operations Business Unit	850,000
Vacant, Unallocated and Unusable	666,000
Total	2,300,000

Electronics Products Business Unit (EPBU) Technology Overview

The electronics products factory includes three process modules: microelectronics, interconnects, and final assembly. Each electronic process module will fabricate all product lines that require the processes of that module. In addition to the three process modules, there will be three manufacturing areas for specialized products: Joint Test Assembly (JTA), Special Electronic Assembly (SEA), and Test Equipment.

The three process modules are:

Microelectronics: All substrates, hybrid microcircuits, chip packages, and leadless chip carriers that require clean room processing are fabricated in the state-of-the-art microelectronics module. The module is located in the new microelectronics facility which was completed in June 1995 and will become fully operational in September 1998.

Interconnects: The interconnects module contains all the processes used to attach and interconnect components. This includes processes such as welding, conventional hand soldering, wave soldering, vapor phase soldering, and belt furnace re-flow soldering. In addition to printed wiring assemblies, interconnect products, such as cables and junction boxes, can be fabricated in this module.

Final Assembly: The fabrication of complete electronic systems is performed in the final assembly module. This consists of the assembly and encapsulation of all components required for complete electronic products. Procured components, printed wiring assemblies, and manufactured hardware are assembled to produce complete electronic systems such as radars, programmers, trajectory sensing, and firesets.

Mechanical Business Unit (MBU) Technology Overview

The Mechanical Business Unit will consist of 14 modules which will fabricate or procure all required product lines. This is a process-based approach for most mechanical technologies, complemented by generic product-based manufacturing departments, mechanical support laboratories, and engineering services as follows:

Mechanical Welding: Mechanical Welding is a process-based activity group providing welded mechanical hardware and welding operations in common support of factory operations. The in-place

consolidation will combine operations which currently exist in Welding Operations, Interim Reservoir Welding, Model Shop and Tool Room, and the Mechanical Welding Laboratory.

Sheet Metal and Mechanical Assembly: The sheet metal fabrication assembly area will provide common support for a range of mechanical and electromechanical products, and includes typical sheet metal processes as well as laser marking.

Electromechanical Assembly: Electromechanical Assembly will be restructured in a downsized and consolidated operation to provide support of stronglinks and other miniature assemblies which have design features that include miniature solenoids, ceramic electrical headers, miniature springs, friction reducing coatings and bearings, low resistance electrical contacts, magnetically coupled switching, and a host of other unique designs. Most miniature mechanisms require assembly in a Class 100 clean environment, utilizing clean benches within a class 100,000 clean room.

Heat Treating and Abrasive Blasting: The heat treat and abrasive blasting areas provide service for all mechanical product lines. Included in the relocation of the Heat Treat department is the replacement of a portion of the furnaces and support equipment which will not survive the relocation due to their poor condition. The structural integrity of the furnaces being replaced is very poor and modifications would be required to refurbish fire brick and heating elements and the equipment may not survive the relocation. Due to the large size of these furnaces and the criticality of this equipment as a unique capability, new furnaces will be procured and installed in the new location prior to excess of the old equipment.

Mechanical Machining: Mechanical machining and inspection will be a downsized and consolidated operation that will fabricate hardware through traditional and non-traditional means in sizes ranging from large case-type housings to miniature piece parts for assemblies. The machined hardware provided by this module will support requirements of all programs at KCP for both internal and external customers.

Reservoir Fabrication and Assembly: Reservoir production responsibility was transferred from the DOE's Rocky Flats Plant to the Kansas City Plant through the nonnuclear reconfiguration program. Because of special handling, cleaning and contamination considerations associated with reservoir production, KCP's reservoir facility contains most processes necessary to manufacture, test and inspect a wide variety of production reservoirs. SMRI implementation will not change the Reservoir facility.

TSD Products Manufacturing: TSD Products Manufacturing supports the secure transportation needs for the DOE Transportation Safeguards Division including refurbishment of existing trailers, original manufacture of the new design Safeguards Transporter Trailer (SGT) and multiple short-term special maintenance activities. The TSD manufacturing area will be consolidated by combining the secure trailer sheet metal area with the primary SGT assembly facility.

Mechanical Support Laboratories: Support laboratories for Mechanical Operations will continue to provide the current types of support, though in a smaller footprint through consolidation.

Plastics Molding & Filled Elastomers: This area supports injection, compression, and transfer molding of thermoset and thermoplastic compounds, and material preparation and compression molding of filled elastomeric products.

Cellular Silicone Production: The Cellular Silicone processing operations will not be consolidated with other operations for material incompatibility reasons. The activities associated with the production of cellular silicone products require three major processes: urea screening; silicone base and cellular silicone compounding; and cellular silicone molding, part processing, and product inspection.

Foam Products: Foam Products is a process-based approach, which has combined equipment needed for fabrication of rigid polyurethane foams, filled elastomer foams and foam desiccant product lines.

Plastics Machining, Assembly & Inspection: In the Plastics Machining, Assembly & Inspection module, the manufacturing and machining of all Special Plastics Case Assemblies and Subassemblies, Gas Getters, Composites, and all other plastic products and the related inspection of these products will be consolidated. This consolidation allows for some enhanced utilization of floor space and equipment.

Plating & Painting: These two process modules provide custom metal finishing services to the entire plant. They are not undergoing consolidation as part of the SMRI project.

Engineered Materials Business Unit (EMBU) Technology Overview

The engineered materials factory consists of four processing modules as follows:

Model Shop and Tool Room: The Model Shop and Tool Room is a support organization that will provide prototype and evaluation hardware, tool and gage fabrication and maintenance, special grinding of cutting tools, and limited tool design in support of unique and short-cycle time needs of production operations.

Engineering Laboratories: The Engineered Materials Business Unit contains several large laboratories. Except for the Nuclear Grade Steels Receiving and Inspection, and Environmental & Non-Destructive test labs, the Engineering Laboratories will remain unchanged by the SMRI project.

Engineering Services: The Engineered Materials Business Unit provides document control, drafting, and other support services for the other business units. These functions are primarily office areas, and are not modified in the SMRI project.

Metrology: Metrology provides calibration services to the plant and will not be modified under SMRI.

Support Operations Technology Overview

Support operations includes boilerhouses, waste management operations, patrol headquarters, stores (including enduring stockpile), maintenance, cafeteria, offices and other functions that are essential for plant operations. Included under this function is the physical plant separation work for walls and utilities and security guard support during construction. Also included is the construction and relocation of a downsized cafeteria. These functions, generally placed in the category of support, are common to plant operations and are not assigned to a specific factory.

Physical Plant Separation: Maximum Foreseeable Fire Loss (MFL) rated separation between the DOE and GSA will be provided by construction of fire rated subdivision walls. Major air handling and utilities systems serving both DOE and GSA will be separated to allow for independent maintenance of these services on both sides of the separation line after the SMRI project is complete.

Stores: New stores will occupy approximately 21 areas, down from the existing 70. Gages and fixtures, chemicals, and some of the production and non-production stores areas will remain in their current locations. Bulk materials and large production and non-production areas will be relocated and resized to meet future stores requirements. This bulk storage area will be located in a high-roof, unexcavated area of the plant which is adjacent to a new high-rack storage area.

Enduring Stockpile: This project provides space for enduring stockpile inventory and to construct fire-rated storage facility enclosures to limit the Maximum Foreseeable Loss (MFL) in accordance with DOE dollar limits. Sites will be provided for a proposed short-term storage of DOE-managed Enduring Stockpile materials. Approximately 105,000 square feet of plant floor space within the new boundaries derived from the facility consolidations will be allocated for the storage of these materials. Thirteen plant areas will be dedicated to this purpose and will be upgraded in place to meet the enduring stockpile storage criteria.

Project Milestones:

FY 1999: A-E work initiated 1Q

FY 2000: Maintain schedules to complete construction by 2Q 2005

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	8,451	8,145
Design Management Costs (1.1% of TEC)	1,268	2,280
Project Management Costs (0.4% of TEC)	422	250
Total Design Costs (8.5% of TEC)	10,141	10,675
Construction Phase		
Buildings	46,381	47,855
Standard Equipment	32,210	35,373
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	3,440	3,270
Construction Management (5.4% of TEC)	6,477	2,370
Project Management (2.4% of TEC)	2,850	1,900
Total Construction Costs (76.5% of TEC)	91,358	90,768
Contingencies		
Design Phase (1.5% of TEC)	1,799	2,215
Construction Phase (13.6% of TEC)	16,202	18,842
Total Contingencies (15.0% of TEC)	18,001	21,057
Total, Line Item Costs (TEC) [b]	119,500	122,500

5. Method of Performance

Design and inspection will be performed under KCP negotiated architect-engineer contract. Construction will be accomplished either by fixed-price contract awarded after competitive proposals or by cost plus incentive fee contracts. All contracts will be administered by AlliedSignal.

[b] The Conceptual Design Report was completed in March 1997. Escalation is calculated to the midpoint of each activity. The escalation rates used were provided by the Independent Cost Estimating Group dated January 1997. Overhead estimates were calculated at a factor of 14 percent for procurement and 85 percent for internal labor. Escalation rates were taken from the FY 1999 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	3,156	931	4,922	2,931	11,940
Construction	0	0	6,569	17,208	19,607	64,176	107,560
Total facility costs (Federal and Non-Federal)	0	0	9,725	18,139	24,529	67,107	119,500
Other project costs							
Conceptual design cost	1,000	0	0	0	0	0	1,000
Other project-related costs	897	2,196	2,756	3,501	3,857	5,993	19,200
Total other project costs	1,897	2,196	2,756	3,501	3,857	5,993	20,200
Total Project Cost (TPC)	1,897	2,196	12,481	21,640	28,386	73,100	139,700

7. Related Annual Funding Requirements

(FY 2005 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–30 years)		
Other costs	18,474	32,598
Total related annual costs (operating from FY 2005 through FY 2034)	18,474	32,598

99-D-128, Stockpile Management Restructuring Initiative— Pantex Plant, Amarillo, Texas

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- Since the submittal of the FY 1999 data sheet, two events have occurred, significantly altering the scope of this project. These were a reevaluation of the activity levels for the Weapons complex and the Congressionally mandated Independent External Assessment (IEA). The first resulted in the need for the Weapons Complex to not downsize as much as previously planned. The second recommended a reevaluation of the project that included enhancing operational flexibility for a potential increase in weapons work and moving routine relocation activities and smaller subprojects out of the project. The recommended reevaluation was performed and resulted in deleting eight subprojects and the Mortgage Reduction Initiative (MRI) from the project.

  The MRI shuts down approximately 230 facilities putting them into Long Term Caretaker (LTC) status at an average cost of $43,000 per facility. The reevaluation determined that these small, routine, low cost efforts were more appropriately performed outside the line item project.

  The reevaluation of the Small Components, NDE Radiography, Gas Analytical Laboratory, Weapons Staging, and the Laundry subprojects revealed that the need for enhancing operational flexibility, as recommended in the IEA, necessitated changes in the locations and/or scopes of these subprojects. In addition, all of these were determined to be independent, relatively low cost ($1,500,000 to $4,000,000), routine relocations that could be performed for less cost and in less time if performed outside the line item project.

  The Metrology, Records Storage, and Maintenance Shops subprojects were reevaluated, and all were determined to be low cost ($2,600,000 to $4,000,000), routine relocations that could be performed for less cost and in less time if performed outside the line item project.

  The reevaluation of the Mass Properties subproject revealed that the function, as pointed out in the IEA, could not be relocated as originally planned; so it has been rescoped to be relocated to a new location.

  The reevaluation of the HE Formulation subproject revealed the need to delete the relocation of equipment from building 11-016; so that work and the placing of building 11-016 in LTC status were deleted from the project.

  The reevaluation of the 35 Account subproject, which includes placing facilities vacated by the 35 Account relocation into LTC status, revealed that two buildings will still be required; so placing them into LTC status was deleted.

  In addition, the burden rates, overhead rates, security guard costs, and Other Project Costs (OPC) were corrected. The OPC increased after completion of a detailed, resources and labor hours "bottom up" estimate.

As a result of the above changes, the Total Estimated Cost (TEC) had a net reduction of $30,100,000, the OPC had a net reduction of $1,262,000, the Total Project Cost had a net reduction of $31,362,000, and the completion of the project was reduced by two years.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	2Q 2003 [a]	4Q 2000	4Q 2006	42,380	49,600
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1999	4Q 2001 [a]	2Q 2000	4Q 2004	13,218	17,863

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	1,108	662	627
2000	3,429	3,660	3,730
2001	4,985	5,200	2,092
2002	3,300	3,300	5,141
2003	286	286	1,518
2004	110	110	110

3. Project Description, Justification and Scope

The Pantex Plant Stockpile Management Restructuring Initiative (SMRI) Project will provide for the design and construction for various relocation and upgrades and for the shutdown of obsolete structures. The project will help to reduce the plant footprint by consolidating functions into fewer and more modern facilities.

The scope for this project has been established based upon the Department of Energy's (DOE) directed workload for the Pantex Plant. This directed workload is the weapons work Pantex is directed to do through Program Control Documents (PCDs), Retirement/Disposal Program Control Documents, the Quality Assurance Production Plan (QAPP), and other special written requests provided by DOE.

The technical baseline for this project has been broken up into three parts that are detailed below:

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[a] Phased design and construction will be required to minimize impact to plant operations.

Relocation of High Explosive Formulation to 11-050

This portion of the SMRI project will remove existing High Explosive (HE) machining equipment from Building 11-050 following startup of HE machining operations in Building 12-121. Building 11-050 will be modified to receive the HE formulation related operations currently performed in Building 12-019 East and Building 12-017, and selected operations and equipment from Building 11-017: Following modifications to Building 11-050 the required equipment from these building will be relocated and the equipment put into operation in Building 11-050. Finally, Building 12-019 East will be placed into a long-term caretaker status. Equipment and support items will be procured and/or relocated as required and any items that cannot be successfully relocated will be replaced. This portion of the SMRI project will be designed to meet the applicable DOE and regulatory requirements in place at the start of Title I design.

Relocate Mass Properties

This portion of the SMRI project will relocate the Mass Properties function to Buildings 12-084 and 12-104 and will consist of modifications to the buildings to accept the mass properties operations from Building 12-060. Four existing pieces of equipment will be replaced by procuring two new, more technically advanced pieces of equipment. Equipment and support items will be procured and/or relocated as required and any items that cannot be successfully relocated will be replaced. This portion of the SMRI project will be designed to meet the applicable DOE and regulatory requirements in place at the start of Title I design.

Relocate 35 Account Materials

This portion of the SMRI project will relocate the 35 Account warehousing activities in Buildings 12-005A, 12-005B, 12-010, 12-009, and Ramp 12-R-010 into Building 12-118. The 35 Account activities include materials in contact with a weapon or weapon component during a weapon assembly, disassembly or test units. Typical materials include such items as epoxy resin, paint, dry air, rubber gloves and acetone. Equipment and support items will be procured and/or relocated as required and any items that cannot be successfully relocated will be replaced. This portion of the SMRI project will be designed to meet the applicable DOE and regulatory requirements in place at the start of Title I design. Buildings 12-005A, 12-005B, 12-010, and 12-R-010 will be placed into Long-term Caretaker status.

Project Milestones:

FY 1999: A-E Work Initiated	3Q
FY 2000: Construction Start	2Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	1,210	2,740
Project Management costs (4.4% of TEC)	579	650
Total Design Costs (13.5% of TEC)	1,789	3,390
Construction Phase		
Improvements to Land	61	264
Buildings	4,298	11,555
Other Structures	510	6,745
Utilities	20	60
Standard Equipment	2,873	1,521
Removal Cost Less Salvage	35	825
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	146	385
Construction Management (5.8% of TEC)	773	414
Project Management (3.4% of TEC)	455	10,059
Total Construction Costs (69.4% of TEC)	9,171	31,828
Contingencies		
Design Phase (2.7% of TEC)	358	1,332
Construction Phase (14.3% of TEC)	1,900	5,830
Total Contingencies (17.1% of TEC)	2,258	7,162
Total, Line Item Costs (TEC) [b]	13,218	42,380

5. Method of Performance

The design services (Title I, II, and III) will be accomplished by an outside A-E firm and will be administered by the Operating Contractor (Mason and Hanger Corporation). Mason and Hanger Corporation will perform portions of the design for selected projects.

The construction services of this project will be performed by an outside construction contractor operating under a contract to be awarded on the basis of competitive bids. This contract will be administered by the Operating Contractor (Mason and Hanger Corporation).

Construction Management Services will be performed by the DOE Operating Contractor.

[b] Escalation rates taken from the FY 1999 DOE escalation multiplier tables. The previous estimate was based on the Independent Cost Reviews (ICR 6/97 and 8/97) of the Conceptual Design Report (Revision 1) and included security guard costs under project management. The current estimate is based on new burden rates and correctly includes security guard costs under construction management.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	627	1,152	289	79	2,147
Construction	0	0	0	2,578	1,803	6,690	11,071
Total facility costs (Federal and Non-Federal)	0	0	627	3,730	2,092	6,769	13,218
Other project costs							
Conceptual design cost	768	0	0	0	0	0	768
NEPA documentation costs	297	51	60	40	33	72	553
Other ES&H costs	0	40	43	20	38	97	238
Other project-related costs	0	384	497	480	782	943	3,086
Total other project costs	1,065	475	600	540	853	1,112	4,645
Total Project Cost (TPC)	1,065	475	1,227	4,270	2,945	7,881	17,863

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--30 years)		
Facility operating costs	355	1,036
Facility maintenance and repair costs	218	259
Programmatic operating expenses directly related to the facility	1,418	12,253
Capital equipment not related to construction but related to the programmatic effort in the facility	350	1,860
Utility costs	106	367
Total related annual costs (operating from FY 2004 through FY 2033)	2,447	15,775

99-D-132, Nuclear Materials Safeguards and Security Upgrades Project, Los Alamos National Laboratory, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- The National Academy of Engineering (NAE) assessment has been completed, project start will be delayed until 2nd quarter of FY 1999, with the project funding profiles adjusted accordingly.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	1Q 2001	3Q 2000	3Q 2004	60,746 a	70,920
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1999	1Q 2001	3Q 2000	3Q 2004	60,746 [a]	70,920

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1999	9,700	9,000	8,000
2000	11,300	10,288	8,742
2001	18,000	16,962	18,000
2002	11,800	14,278	15,340
2003	9,946	6,646	6,700
2004	0	3,572	3,964

[a] TEC and Financial Schedule reflects Phase 1 only. Phase 2 cost estimate and funding profile will be completed as part of future conceptual design efforts.

3. Project Description, Justification and Scope

The Nuclear Material Safeguard and Security Project (NMSSUP) replaces the existing Los Alamos National Laboratory-wide security system, addresses Special Nuclear Material (SNM) facility requirements, and addresses malevolent vehicle threats at key nuclear facilities. Assessments of the LANL safeguards and security system have identified numerous system deficiencies due to aging equipment and outdated technologies. The NMSSUP will provide a reliable safeguards and security system to ensure the protection and control of SNM, classified matter, and Departmental property supporting current missions at LANL.

The NMSSUP is broken into two phases to accomplish the project goals. The currently requested Phase 1 will provide for the replacement of safeguard and security control systems (computers/communications links, etc.) and modification of related facilities. A planned Phase 2 may replace or build perimeter detection systems and address the threat of public traffic on uncontrolled roads near key nuclear facilities.

This project is to provide necessary upgrades to the existing Laboratory-wide security systems to bring them into compliance with DOE Order 5632.1C and to address deficiencies cited in the pending Los Alamos National Laboratory (LANL) Site Safeguards and Security Plan (SSSP). The systems being upgraded have been in operation for up to 14 years, have exceeded their useful design life, and are in need of replacement. Funding is required to continue safe, secure, economical operation of the Laboratory.

The Phases of the security system to be upgraded or replaced may include the following:

Phase 1

A new security system will be installed to include multiple host computers, operator interface consoles, upgrades to existing facilities, and a dedicated communications system. Existing facilities will be upgraded to serve as a Central Alarm Station (CAS) and Secondary Alarm Station (SAS) which will house the host computers and security monitoring personnel. To support the transition of the TA-55 local assessment facility for operation as the new CAS, an un-staffed assessment console room at TA-64-1 will be provided. Additional detail is provided below.

Control System

The project will replace the existing Laboratory security system, Basic Rapid Alarm Security System (BRASS), computers and software with Argus, a security system provided by Lawrence Livermore National Laboratory (LLNL). The CAS and SAS will be reconfigured, and minor remodeling of the badging office will be performed to accommodate Argus enrollment stations.

Facilities

CAS (TA-55-142) will be upgraded to house the host system computer and new operator consoles. A small utility building will be constructed to accommodate facility support equipment, and provide space for supervisory personnel.

SAS (TA-3-440) will be upgraded to house the host system computer and new operator consoles. A small utility building will be constructed to accommodate facility support equipment. Limited Area

fencing and barricades will be installed to enclose the SAS to provide proper security. This facility will also house the training console to support the Argus system.

TA-64-1 will be upgraded to house a new un-staffed assessment console to support the transition of the TA-55-142 local assessment room for operation as the CAS. This area will continue to house and support the existing LANL fire protection control and alarm system on the existing BRASS.

Communications System

A new fiber optic communications network will replace the existing telephone circuits connecting the security control computers to the field concentrators. Phase 1 will install the portion of the communications system that connects the new host computers to the security concentrators at LANL's Category I SNM facilities TA-55 and TA-18. In addition, the communications circuits needed to connect the computers in the CAS, SAS, and the un-stalled assessment console room will be installed in Phase 1. Because Phase 1 involves installing fiber-optic bundles coming out from the CAS and SAS, those bundles will be sized with adequate capacity in Phase 1 to accommodate the number of fibers needed to support Phase 2.

Planned Phase 2

Category 1 SNM Facilities and NMSM Facilities

Includes protection of the following Category 1 SNM Facilities, such as:

- TA-55, Plutonium Facility.
- TA-18, Los Alamos Critical Experiments Facility (LACEF).

Phase 2 may also evaluate requirements for controlling proximity of public traffic to TA-3 facilities and modify traffic profiles and patterns if needed and address SSSP requirements as necessary to reduce overall security risks at LANL.

Project Milestones

FY 1999:	Start design and procurement activities for the control system, facility modifications, and communication system	1Q
FY 2000:	Start construction of facility modifications, control and communications system	3Q

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	4,930	4,930
Design Management costs (1 9% of TEC)	1,200	1,200
Project Management costs (1.3% of TEC)	800	800
Total Design Costs (11.4% of TEC)	6,930	6,930
Construction Phase		
Improvements to Land	5,625	5,625
Buildings	6,964	6,964
Special Equipment	21,540	21,540
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	4,290	4,290
Construction Management (3.5% of TEC)	2,136	2,136
Project Management (8.7% of TEC)	5,261	5,261
Total Construction Costs (75.4% of TEC)	45,816	45,816
Contingencies		
Design Phase (1.7% of TEC)	1,050	1,050
Construction Phase (11.4% of TEC)	6,950	6,950
Total Contingencies (13.2% of TEC)	8,000	8,000
Total, Line Item Costs (TEC) [b]	60,746	60,746

5. Method of Performance

Engineering, design and inspection will be accomplished under a negotiated architect-engineer (A-E) contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. The computer system will be procured and installed through a cooperative agreement with Lawrence Livermore National Laboratory.

[b] Escalation rates taken from the FY 1999 DOE escalation multiplier tables. TEC and Financial Schedule reflect Phase 1 only. Phase 2 cost estimate and funding profile will be completed as part of the future conceptual design efforts.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	0	2,342	2,438	2,640	1,000	8,420
Construction	0	0	5,658	6,304	15,360	25,004	52,326
Total facility costs (Federal and Non-Federal)	0	0	8,000	8,742	18,000	26,004	60,746
Other project costs							
Conceptual design cost	575	500	0	0	0	0	1,075 [c]
NEPA documentation costs	50	0	0	0	0	0	50
Other ES&H costs	0	5	50	75	110	840	1,080
Other project-related costs	950	295	750	725	1,090	4,159	7,969
Total other project costs	1,575	800	800	800	1,200	4,999	10,174
Total Project Cost (TPC)	1,575	800	8,800	9,542	19,200	31,003	70,920

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs	1,874	1,874
Facility maintenance and repair costs	902	902
Utility costs	59	59
Total related annual costs (operating from FY 2004 through FY 2023)	2,835	2,835

[c] Conceptual design costs over Phase 1 activities only. Phase 2 cost estimate and funding profile will be completed as part of the future conceptual design efforts.

98-D-123 Stockpile Management Restructuring Initiative— Tritium Facility Modernization and Consolidation, Savannah River Plant, Aiken, South Carolina

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin)

Significant Changes

- Physical completion date has been adjusted due to delayed start of design on most processes in Building 233-H.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	2Q 1998	1Q 2000	1Q 1999	2Q 2002	68,790	85,540
FY 1999 Budget Request [a]	2Q 1998	2Q 2000	3Q 1998	3Q 2004	98,400	122,000
FY 2000 Budget Request [b] *(Current Baseline Estimate)*	2Q 1998	3Q 2000	3Q 1998	4Q 2004	98,400	122,000

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1998	11,000	11,000	5,092
1999	27,500	27,500	18,108
2000	21,800	21,800	25,700
2001	24,200	24,200	32,400
2002	10,800	10,800	14,000
2003	2,200	2,200	2,200
2004	900	900	900

[a] Reflected changes from including scope and associated funding to process tritium containing gases from the Commercial Light Water Reactor (CLWR), which was originally included in the Tritium Extraction Facility (Line Item 98-D-125).

[b] Reflects changes in schedule due to delayed start of design on most processes in Building 233-H.

3. Project Description, Justification and Scope

In 1994, production operations were curtailed at three of the seven weapons production facilities (Mound in Ohio, Pinellas in Florida, and Rocky Flats in Colorado). Their production responsibilities were transferred to two of the remaining four production plants (Kansas City Plant and Savannah River Site (SRS) and to two of the national laboratories (Los Alamos National Laboratory (LANL) and Sandia National Laboratory, New Mexico). After the closure of these production operations, studies were continued to determine the optimum size and configuration of the nuclear weapons complex. It was recognized that the remaining four production facilities provided excess capacity than that required to support the projected stockpile, and that further closure and consolidation or significant downsizing of operations was necessary. Studies were begun in late 1994 to address whether the reduced stockpile levels necessitated further plant closures and consolidation/collocation at the weapons laboratories or supported the downsizing of operations at the existing production plants. These studies were used to assess all reasonable alternatives which required little or no construction of new facilities. The result of these in-depth programmatic assessments culminated in the development and approval of the Justification of Mission Need document and the Critical Decision I authorization for the Stockpile Management Restructuring Initiative (SMRI) on April 2, 1996.

The SMRI will support the implementation of Departmental decisions related to production facility downsizing or relocation of missions consistent with the Stockpile Stewardship and Management (SSM) Programmatic Environmental Impact Statement (PEIS) and the Tritium Supply and Recycling PEIS Records of Decision (ROD). The preferred alternative for restructuring the stockpile management complex was announced by the Secretary of Energy on February 28, 1996. The Secretary of Energy approved a ROD for the Tritium Supply and Recycling PEIS on December 5, 1995.

The goal of the Stockpile Management Program, as implemented by the SMRI, is to attain the following objectives: (1) fully support the evaluation, enhanced surveillance, maintenance, and repair of the enduring stockpile; (2) provide flexibility to respond to new requirements or to achieve further reductions in the stockpile size; (3) maintain and improve (where necessary) the manufacturing technology necessary to fully support the stockpile; and (4) achieve significant reductions in operating costs for the complex.

The SMRI involves (1) the downsizing of weapons assembly/disassembly and high explosives missions at the Pantex Plant; (2) downsizing nonnuclear component manufacturing at the Kansas City Plant; (3) downsizing weapons secondary and case fabrication at the Oak Ridge Y-12 Plant; and (4) consolidation of existing tritium operations at the SRS.

No new facilities are being proposed for implementing the SMRI. Existing facilities will be utilized to the maximum extent possible. All existing facilities that have been identified for utilization under each site specific recommended alternative will be repaired, upgraded, and/or modified to meet current environment, safety, and health requirements. In addition, they will be configured to maximize effectiveness and efficiency in support of the site-specific downsizing and/or consolidation management capability requirements for the smaller stockpile.

The Tritium Facility Modernization and Consolidation work package will relocate several process systems and equipment and/or process functions from Buildings 232-H into existing buildings within the Tritium Facility. High and Moderate hazard processes will be relocated into Building 233-H.

Low Hazard processes will be relocated to the North end of Building 234-H. The Building 233-H and 234-H service support systems will be upgraded to accommodate the additional loads.

The consolidation of Tritium processing activities into Buildings 233-H, 249-H, and the newer portion of 234-H will improve the safety of operations, reduce environmental releases, improve productivity, and significantly reduce future operating costs.

The consolidation of equipment into fewer operating buildings will allow for the reduction of maintenance, operations, and support staffing. The closure of 232-H will further reduce the Defense Programs operating budget for the Savannah River Site (SRS). It is estimated that financial pay back for this project can be realized in approximately four years.

The scope of work also includes work that was transferred from the Tritium Extraction Facility, Line Item 98-D-125. These are increases in capacities and flows in the primary separation system, process stripper/tritium recovery system, glovebox stripper/tritium recovery system. Also added is an isotope separation process. These additions will allow the Consolidation project to handle additional process and waste gases from any new tritium source.

Project Milestones

FY 1999: Physical construction start

FY 2000: A-E Work Completed 3Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	13,370	13,370
Design Management Costs (0.4% of TEC)	413	413
Project Management Costs (1.0% of TEC)	987	987
Total Design Costs (15.0% of TEC)	14,770	14,770
Construction Phase		
Improvements to Land	100	100
Buildings [c]	5,300	5,300
Special Equipment	36,345	36,345
Standard Equipment	3,080	3,080
Removal Cost Less Salvage	1,645	1,645
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	7,034	7,034
Construction Management (2.0% of TEC)	1,995	1,995
Project Management (2.4% of TEC)	2,367	2,367
Total Construction Costs (58.8% of TEC)	57,866	57,866
Contingencies		
Design Phase (5.3% of TEC)	5,240	5,240
Construction Phase (20.9% of TEC)	20,524	20,524
Total Contingencies (26.2% of TEC)	25,764	25,764
Total, Line Item Costs (TEC) [d]	98,400	98,400

5. Method of Performance

The Management and Operating (M&O) contractor, Westinghouse Savannah River Company, will have overall project performance responsibility. The M&O contractor will accomplish design, construction and procurement, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

[c] This amount includes improvements to land, special equipment, other structures and utilities with more exact breakout to be determined.

[d] Escalation rates taken from the FY 1998 DOE escalation multiplier tables.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	5,092	11,108	3,810	0	0	20,010
Construction	0	0	7,000	21,890	32,400	17,100	78,390
Total facility costs (Federal and Non-Federal)	0	5,092	18,108	25,700	32,400	17,100	98,400
Other project costs							
R&D necessary to complete construction	400	400	0	0	0	0	800
Conceptual design cost	300	0	0	0	0	0	300
Decontamination and Decommissioning (D&D)	0	200	0	0	0	0	200
NEPA documentation costs	0	30	0	0	0	0	30
Other ES&H costs	0	10	80	130	190	400	810
Other project-related costs	800	2,760	2,220	2,570	4,010	9,100	21,460
Total other project costs	1,500	3,400	2,300	2,700	4,200	9,500	23,600
Total Project Cost (TPC)	1,500	8,492	20,408	28,400	36,600	26,600	122,000

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–30 years)		
Facility operating costs	330	330
Facility maintenance and repair costs	440	440
Programmatic operating expenses directly related to the facility	1,100	1,100
Capital equipment not related to construction but related to the programmatic effort in the facility	30	30
GPP or other construction related to the programmatic effort in the facility	10	10
Utility costs	170	170
Total related annual costs (operating from FY 2004 through FY 2033)	2,080	2,080

98-D-124, Stockpile Management Restructuring Initiative—Y-12 Consolidation, Y-12 Plant, Oak Ridge, Tennessee

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- The original scope of 98-D-124, Stockpile Management Restructuring Initiative--Y-12 Consolidation, was based on the assumed activity levels for the weapons complex evaluated by the Programmatic Environmental Impact Statement (PEIS) and the Record of Decision (ROD). To see if excessive downsizing or impact to meeting mission requirements may occur, a Y-12-specific evaluation, the Y-12 Capacity Study, was begun in 1997, and the project scope was also evaluated against the Nuclear Weapons Production and Planning Directive (P&PD) 99-0 and the Albuquerque Workload Planning Guidance (AWLPG) 99-0 (U). The completed studies revealed that the initial project scope, if completed, would downsize the Y-12 Plant to a point that would impact the expected mission requirements. Consequently, the project scope has been reduced with the following changes:
  - Building 9201-5W will be returned to active status rather than placed in Cold Stand-by.
  - The existing Special Material Purification Facility will be restarted rather than install a new Special Material Pilot Plant Facility in Building 9805-1.
  - Building 9204-2 will remain in active status and the following subprojects will be deleted: Lithium Equipment Relocation to Building 9204-2E; and Lithium Equipment Relocation to Building 9998 G3. The Ceramic Machining Operations, with appropriate enclosure and ventilation, will be relocated to Building 9204-2 instead of Building 9998 G3.
  - A work package has been added to refurbish two Induction Casters in Building 9998.
  - All natural phenomena upgrades have been deleted from the project.
  - The scope changes reduce the TEC from $42,500,000 to $24,800,000.
  - The OPC has been reduced from $10,300,000 to $8,400,000 due to reductions in the need for safety documentation resulting from not relocating equipment to the basement of Building 9204-2E and Building 9998, G3.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	1Q 1998	2Q 2000	2Q 1999	4Q 2002	42,500	52,800
FY 1999 Budget Request	1Q 1998	2Q 2000	2Q 1999	4Q 2002	42,500	52,800
FY 2000 Budget Request *(Current Baseline Estimate)*	4Q 1998	4Q 2001	2Q 1999	4Q 2002	24,800	33,200

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1998	6,450	6,450	8
1999	10,700	10,700	4,192
2000	3,150	3,150	10,600
2001	4,500	4,500	8,100
2002	0	0	1,900

3. Project Description, Justification and Scope

In 1994, production operations were curtailed at three of the seven weapons production facilities (Mound in Ohio, Pinellas in Florida, and Rocky Flats in Colorado). Their production responsibilities were transferred to two of the remaining four production plants (Kansas City Plant and Savannah River Site (SRS)) and to two of the national laboratories (Los Alamos National Laboratory (LANL) and Sandia National Laboratories, New Mexico). After the closure of these production operations, studies were continued to determine the optimum size and configuration of the nuclear weapons complex. It was recognized that the remaining four production facilities provided excess capacity than that required to support the projected stockpile, and that further closure and consolidation or significant downsizing of operations was necessary. Studies were begun in late 1994 to address whether the reduced stockpile levels necessitated further plant closures and consolidation/collocation at the weapons laboratories or supported the downsizing of operations at the existing production plants. These studies were used to assess all reasonable alternatives which required little or no construction of new facilities. The result of the programmatic assessments of these alternatives studies culminated in the initial development of the Stockpile Management Restructuring Initiative (SMRI). In 1995 the Department formally evaluated production facility downsizing and relocation of missions in the Stockpile Stewardship and Management (SSM) Programmatic Environmental Impact Statement (PEIS). The preferred alternative for restructuring the stockpile management complex was approved by the Secretary of Energy on December 19, 1996.

The goal of the Stockpile Management Program is to attain the following objectives: (1) fully support the evaluation, enhanced surveillance, maintenance, and repair of the enduring stockpile; (2) provide flexibility to respond to new requirements or to achieve further reductions in the stockpile size; (3) maintain and improve (where necessary) the manufacturing technology necessary to fully support the stockpile; and (4) achieve significant reductions in operating costs for the complex.

The SMRI involves (1) the downsizing of weapons assembly/disassembly and high explosives missions at the Pantex Plant; (2) downsizing nonnuclear component manufacturing at the Kansas City Plant; (3) downsizing weapons secondary and case fabrication at the Oak Ridge Y-12 Plant; and (4) consolidation of existing tritium operations at the SRS.

The original scope of 98-D-124, Stockpile Management Restructuring Initiative--Y-12 Consolidation, was based on the assumed activity levels for the weapons complex evaluated by the Programmatic Environmental Impact Statement (PEIS) and the Record of Decision (ROD). To see if excessive downsizing or impact to meeting mission requirements may occur, a Y-12-specific evaluation, the Y-12 Capacity Study, was begun in 1997, and the project scope was also evaluated against the Nuclear Weapons Production and Planning Directive (P&PD) 99-0 and the Albuquerque Workload Planning Guidance (AWLPG) 99-0 (U). The completed studies revealed that the initial project scope, if completed, would downsize the Y-12 Plant to a point that would impact the expected mission requirements. Therefore, the project scope was reduced.

No new facilities are being proposed for implementing the SMRI. Existing facilities will be utilized to the maximum extent possible. All existing facilities that have been identified for utilization under each site-specific recommended alternative will be repaired, upgraded, and/or modified to meet current environment, safety, and health requirements. In addition, they will be configured to maximize effectiveness and efficiency in support of the site-specific downsizing and/or consolidation management capability requirements for the smaller stockpile.

The consolidation of the Canned Subassemblies mission at Y-12 will reduce the existing Defense Programs (DP) manufacturing footprint to approximately 1,200,000 square feet of active production space, a reduction of 50 percent. The consolidation work will take place in Buildings 9201-5N, 9204-2E, 9204-2, 9201-5W, 9212, and the 9215/9998 complex and peripheral support buildings. The facilities work required includes (1) capital equipment relocation; (2) capital equipment procurement and installation; and (3) reactivation of 9201-5W.

The primary purpose of this project is to complete the overall downsizing of the Y-12 manufacturing footprint. This project is part of a long range consolidation plan that began in 1992. Along with previously completed projects and other currently funded consolidation projects, SMRI completes the consolidation of manufacturing operations into a smaller footprint area. After completing process consolidation activities at Y-12 and the subsequent safe and compliant shut down of excess facilities, an annual savings of $10 million to $12 million dollars has been projected.

This Y-12 downsizing will consolidate secondary and case manufacturing processes into a significantly smaller production footprint.

The activities associated with the project centralizes the DP production functions in the western area of the Y-12 Plant. The subprojects will consist of the following tasks:

- Relocation and/or hook-up of several machine tools to Building 9215 M-wing for the Enriched Uranium machining function.
- Placing Building 9201-5W Machine Shop in active status to meet the current projected workload.
- Providing a depleted uranium sawing operation, and a furnace for dismantled weapon material consolidation in Building 9212 A-2 wing.
- Refurbish casting furnaces (2) in Building 9998.
- Relocating Ceramic Machining equipment to Building 9204-2 Area and providing enclosures and ventilation.
- Restart the existing Special Material Purification Facility in Building 9404-11.

Project Milestones:

FY 1999: Physical construction start 2Q

FY 2000: Maintain schedules to complete construction by 4Q 2004

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications - $1,055)	1,810	4,200
Project Management Costs (1.6% of TEC)	390	300
Total Design Costs (8.9% of TEC)	2,200	4,500
Construction Phase		
Buildings	3,270	0
Special Equipment	13,540	28,040
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	240	1,680
Construction Management (0.9% of TEC)	230	0
Project Management (2.9% of TEC)	710	1,200
Total Construction Costs (72.5% of TEC)	17,990	30,920
Contingencies		
Design Phase (1.7% of TEC)	430	580
Construction Phase (16.8% of TEC)	4,180	6,500
Total Contingencies (18.6% of TEC)	4,610	7,080
Total, Line Item Costs (TEC) [a]	24,800	42,500

[a] Escalation rates taken from the FY 1998 DOE escalation multiplier tables.

5. Method of Performance

Design and inspection will be performed by the Management and Operating (M&O) Contractor. Construction shall be accomplished by MK-Ferguson direct-hire forces with some fixed-price contractor support. M&O Contractor personnel will perform construction support and plant support activities in support of the line item.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	0	3	1,557	865	205	0	2,630
Construction	0	5	2,635	9,735	7,895	1,900	22,170
Total facility costs (Federal and Non-Federal)	0	8	4,192	10,600	8,100	1,900	24,800
Other project costs							
Conceptual design cost	1,500	0	0	0	0	0	1,500
Other project-related costs	0	200	1,500	1,100	1,780	2,320	6,900
Total other project costs	1,500	200	1,500	1,100	1,780	2,320	8,400
Total Project Cost (TPC)	1,500	208	5,692	11,700	9,880	4,220	33,200

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--20 years)		
Facility operating costs	38,400	129,240
Facility maintenance and repair costs	1,000	13,452
Total related annual costs (operating from FY 2002 through FY 2021)	39,400	142,692

98-D-125 Tritium Extraction Facility, Savannah River Plant, Aiken, South Carolina

(Changes from FY 1998 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- The funding profile shown on this Data Sheet is based on completion of Conceptual Design, and reflects current programmatic direction resulting from the Secretary of Energy's December 1998 decision that the Commercial Light Water Reactor (CLWR) will be the primary new source for production of tritium. A project rebaselining will be completed by March 1999 to fully assess and document baseline changes resulting from the technology selection and completion of Preliminary Design.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	1Q 1998	4Q 2002	1Q 1999	3Q 2005	TBD	TBD
FY 1999 Budget Request	[a]	[a]	[a]	[a]	[a]	[a]
FY 2000 Budget Request *(Current Baseline Estimate)*	1Q 1998	3Q 2001	1Q 2000	4Q 2004 [b]	285,650	390,650

[a] The FY 1999 budget request for the Tritium Supply Program was $157,000,000 in operating funds to pursue the tritium option selected by the Department in December 1998. No capital funding was requested. Congress appropriated $167,000,000 (operating). To fund necessary TEF construction activities in FY 1999, the Department requested $6,00,000 of the $167,000,000 be reprogrammed to capital funds. Approval of the reprogramming was granted January 1999.

[b] Final system turnover to integrated startup testing.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1998	9,650	9,650	6,911
1999	6,000	6,000	8,500
2000	33,000	33,000	32,000
2001	51,000	51,000	49,000
2002	54,000	54,000	53,000
2003	58,000	58,000	58,000
2004	37,000	37,000	38,000
2005	25,000	25,000	26,000
2006	12,000	12,000	14,239

3. Project Description, Justification and Scope

Tritium is a radioactive isotope of hydrogen used in all of the Nation's nuclear weapons. Without tritium, nuclear weapons will not work as designed. At present, no tritium is produced by the U.S. for the nuclear weapons stockpile. Radioactive decay depletes the available tritium by approximately 5.5% each year. In order for these weapons to operate as designed, tritium must be periodically replaced. Although tritium has not been produced by the U.S. for the stockpile since the shutdown of the last production reactor in 1988, tritium requirements have been met through reuse of tritium recovered from dismantled weapons. In order to maintain the START I force structure and five year reserve approved by the President in the 1996 Nuclear Weapons Stockpile Memorandum, a new production capability should come on line about 2005. To meet this date, site preparation and construction of the Tritium Extraction Facility (TEF) must begin in FY 2000. As part of the dual track production strategy, stated in the Record of Decision for the Tritium Supply and Recycling Final Programmatic Environmental Impact Statement, issued on December 5, 1995, the CLWR TEF shall be constructed at the Savannah River Site. The CLWR TEF shall provide the capability to receive and extract gases containing tritium from CLWR Tritium Producing Burnable Absorber Rods (TPBAR), or other targets of similar design. The TEF will provide shielded remote TPBAR handling for the extraction process, clean-up systems to reduce environmental impact from normal processing and accidental releases, and delivery of extracted gases containing tritium to the Tritium Recycle Facility for further processing.

The TEF will consist of a concrete industrial facility constructed partly below grade. The facility is divided into two major areas: (1) a 15,500 square foot remote handling area (RHA) and (2) a 26,500 square foot tritium processing building. The tritium processing building will be entirely above-ground; the floor of the RHA will be below grade. Major processes and operation systems included within the TEF will be: (1) the Receiving, Handling, and Storage System that will support all functions related the receipt, handling, preparation, and storage of incoming TPBAR and outgoing radioactive waste materials; (2) the Tritium Extraction System that will remove tritium and other gases from the TPBARs, remove contaminates from the gas stream, and store the tritium/helium mixture; (3) the Tritium/Product Process Systems that will separate and purify process gases from the irradiated TPBARs; (4) the Tritium Analysis and Accountability Systems that will support monitoring and tritium accountability; (5) the Solid Waste Management System that will receive solid waste generated by TEF for management and storage prior to disposal in the E-Area vaults; and (6) the Heating, Ventilation, and Air Conditioning System that would provide and distribute conditioned supply air to the underground RHA and the above ground tritium processing area and also discharge exhaust air to the environment via a 100-foot stack.

With CLWR as a basis, the TEF will provide steady-state production capability to the Tritium Recycle Facility (Building 233-H) of as much as 3Kg of tritium per year, if needed. Final purification of gases containing tritium shall be performed in the augmented process equipment located in the Tritium Recycle Facility.

The TEF shall have an operational life span of at least 40 years, minimize radiological and chemical releases to the environment; and minimize waste generation. The TEF security requirements shall be such that TEF is designated as an exclusion area and tritium processing facilities are to be located above ground.

Project Milestones

As baselined, the TEF will be dependent on the Tritium Modernization and Consolidation Project. With this project being completed during 3rd Quarter FY 2004, the final tritium systems will be available for processing extraction gases to ensure weapons stockpile requirements will be met in CY 2005.

FY 1998: Initiation of Preliminary Design

Completion of Preliminary Design

FY 1999: CD 2B Approval to Begin Final Design

Initiation of Final Design

CD-3 Approval to Begin Construction

FY 2000: Initiation of Site Preparation

FY 2001: Completion of Final Design

Completion of Site Preparation

Initiation of Facility Construction

FY 2004 Completion of Facility Construction (Final system turnover to integrated system testing)

FY 2005: Initiation of Integrated System Testing with Tritium

FY 2006: Project Completion

CD-4 – Start of Facility Operations

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	33,100	[c]
Design Management Costs (0.6% of TEC)	1,649	
Project Management Costs (1.6% of TEC)	4,520	
Total Design Costs (13.7% of TEC)	39,269	
Construction Phase		
Improvements to Land	3,082	
Buildings	125,508	
Special Equipment	14,212	
Standard Equipment	1,487	
Major Computer Items	6,047	
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	8,348	
Construction Management (5.5% of TEC)	15,764	
Project Management (2.5% of TEC)	7,280	
Total Construction Costs (63.6% of TEC)	181,728	
Contingencies		
Design Phase (10.2% of TEC)	29,053	
Construction Phase (12.5% of TEC)	35,600	
Total Contingencies (22.7% of TEC)	64,653	
Total, Line Item Costs (TEC)	285,650	

General and administrative overhead rates were calculated at a factor of 5% for TEC and 28% for OPC.

5. Method of Performance

Savannah River Site M&O Contractor (WSRC) will be responsible for the design, construction, inspection and commissioning of the TEF to be built at the Savannah River Site. All conceptual work has been completed by site forces. Preliminary Design has been completed by direct site forces. Final Design will be performed by site forces or by a subcontractor to WSRC. Based on competitive bid process, a

[c] This is the initial estimate. The FY 1998 data sheet requested design funds only and did not provide a breakdown of project costs.

general construction subcontractor will be selected to perform construction and start up activities through non-radioactive gas testing. Final testing with radioactive gases will be done by site forces.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	FY 2002	Outyears	Total
Total project costs							
Total facility Costs							
Design	9,650	6,000	26,000	1,200	1,100	10,953	54,903
Construction	0	0	7,000	49,800	52,900	121,047	230,747
Total facility costs (Federal and Non-Federal)	9,650	6,000	33,000	51,000	54,000	132,000	285,650
Other project costs							
Conceptual design cost	3,541	0	0	0	0	0	3,541
NEPA documentation costs	1,858	0	0	0	0	0	1,858
Other project-related costs	5,601	6,000	3,000	5,000	12,000	68,000	99,601
Total other project costs	11,000	6,000	3,000	5,000	12,000	68,000	105,000
Total Project Cost (TPC)	20,650	12,000	36,000	56,000	66,000	200,000	390,650

7. Related Annual Funding Requirements

(FY 2005 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--40 years)		[d]
Facility operating costs	1,550	
Facility maintenance and repair costs	2,500	
Programmatic operating expenses directly related to the facility	6,800	
Capital equipment not related to construction but related to the programmatic effort in the facility	700	
GPP or other construction related to the programmatic effort in the facility	400	
Utility costs	950	
Total related annual costs (operating from 2005 through 2044)	12,900	

[d] Initial estimate. The FY 1998 data sheet requested design funds only and did not include annual funding requirements.

98-D-126, Accelerator Production of Tritium, Various Locations

(Changes from FY 1998 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

In December, 1998 the Department selected the Commercial Light Water Reactor (CLWR) to serve as the primary source of tritium with APT to be developed as a backup capability. As backup, a development and demonstration program and preliminary design of the APT plant will be completed. Capital funding is necessary in FY 2000 to continue preliminary design of the APT plant. Detailed planning for APT as backup is underway. This budget request is based on best available planning information.

The FY 1999 budget request for the Tritium Supply Program was $157,000,000 in operating funds to pursue the tritium option selected by the Department in December 1998. No capital funding was requested. Congress appropriated $167,000,000 (operating). To fund necessary APT design activities in FY 1999, the Department requested $20,000,000 of the $167,000,000 operating funds be reprogrammed to capital funds. Approval of the reprogramming was granted in January 1999.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	1Q 1998	4Q 2002	NA	NA	NA	NA
FY 1999 Budget Request [a]	NA	NA	NA	NA	NA	NA
FY 2000 Budget Request *(Current Baseline Estimate)* [b]	1Q 1998	4Q 2001	NA	NA	144,865	660,616

[a] The FY 1999 budget request for the Tritium Supply Program was $157,000,000 in operating funds to pursue the tritium option selected by the Department in December 1998. No capital funding was requested. Congress appropriated $167,000,000 (operating) To fund necessary APT design activities in FY 1999, the Department requested $20,000,000 of the $167,000,000 be reprogrammed to capital funds. Approval of the reprogramming was granted January 1999.

[b] The FY 2000 budget request is based on selection of APT as backup to the primary tritium production source. As backup, development and demonstration and preliminary design of the APT plant will be completed. Capital funding requested for FY 2000 is necessary to continue preliminary design activities.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1998	67,865	67,865	36,722
1999	20,000 [c]	20,000	46,157
2000	31,000 [d]	31,000	38,795
2001	26,000	26,000	23,191
Total	144,865	144,865	144,865

3. Project Description, Justification and Scope

In December, 1998 the Department selected the CLWR to serve as the primary source of tritium with APT to be developed as a backup capability. As backup, an engineering development and demonstration program and preliminary design of the APT plant will be completed.

Tritium is a radioactive isotope of hydrogen used in all of the Nation's nuclear weapons. Without tritium, nuclear weapons will not work as designed. At present, no tritium is produced by the U.S. for the nuclear weapons stockpile. Radioactive decay depletes the available tritium by approximately 5.5% each year. A tritium production capability is required to maintain the nuclear defense structure.

The Secretary of Energy issued a Record of Decision for the Tritium Supply and Recycling Final Programmatic Environmental Impact Statement on December 5, 1995. That Record of Decision announced a plan to pursue a dual track production scenario to ensure an adequate tritium supply, which authorized work to 1) design, build, and test critical components of an accelerator system for tritium production; and 2) purchase an existing CLWR or irradiation services with an option to purchase the reactor for conversion to a defense facility.

On December 22, 1998 the Department selected CLWR to serve as the primary source of tritium with APT to be developed as a backup capability. As such APT must be prepared to be activated as the primary source relatively quickly for some years. To meet this mission the project will complete an engineering development and demonstration program and complete preliminary design for an accelerator-based plant to produce tritium. As the backup, the APT project continues two major activities: 1) the development and demonstration of key components of the linear accelerator and

[c] The FY 1999 budget request for the Tritium Supply Program was $157,000,000 in operating funds to pursue the tritium option selected by the Department in December 1998. No capital funding was requested. Congress appropriated $167,000,000 (operating). To fund necessary APT design activities in FY 1999, the Department requested $20,000,000 of the $167,000,000 be reprogrammed to capital funds. Approval of the reprogramming was granted January 1999.

[d] The FY 2000 budget request is based on selection of APT as backup to the primary tritium production source. As backup, development and demonstration and preliminary design of the APT plant will be completed. Capital funding requested for FY 2000 is necessary to continue preliminary design activities.

target/blanket technologies, and 2) the preliminary design of the APT plant. The program will complete its work in an orderly manner over a period of three years. At the end of that period the program will have proved all major technologies and produced a preliminary design of the plant with prototype designs for a few items advanced beyond preliminary design. Together these results and a site specific Environmental Impact Statement will make it possible, if necessary, to quickly start construction and to build an APT plant in a relatively short period of time. The three year period for completion of engineering development and demonstration and design will avoid an abrupt stop with concomitant major personnel layoffs.

Development activities include: demonstration of integrated high-power operation of the Low Energy Demonstration Accelerator (LEDA) up to 8 MeV, fabrication and high-field testing of a prototypic superconducting radio-frequency cryomodule and the high-power couplers that bring RF power into the superconducting cavities, materials performance analysis, target/blanket development, and validation of neutron and tritium production codes. The results of the development and demonstration program will be fully documented. Facilities with radioactive material will be cleaned up following completion of testing.

Preliminary design packages will be developed for each major facility subsystem and prototype design (with drawings) will be completed for a few key components needed early in construction. A Preliminary Design report will be prepared to fully document the design. Necessary environment, safety and health analysis and documentation will be completed to facilitate a rapid start of construction.

Project Milestones

FY 1998: Begin engineering design of the APT plant

Complete Modular Design Study of the APT plant

FY 1999: Continue engineering development and demonstration activities, including:

- Demonstration of radio frequency quadrupole operation

Complete Environmental Impact Statement for the Savannah River Site

Continue engineering design of the accelerator, target/blanket, and balance of plant facilities

FY 2000: Continue engineering development and demonstration activities

Continue engineering design of the accelerator, target/blanket, and balance of plant facilities

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate [e]	Previous Estimate [f]
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	108,649	254,566
Design Management Costs (6.0% of TEC)	8,692	26,567
Project Management Costs (5.0% of TEC)	7,243	22,139
Total Design Cost (86.0% of TEC)	124,584	303,272
Contingencies		
Design Phase (14.0% of TEC)	20,281	139,505
Total Line Item Cost [g]	144,865	442,777

5. Method of Performance

A multi-laboratory project team led by Los Alamos National Laboratory and supported by the Prime Contractor, Burns and Roe Enterprises, Incorporated (BREI), and the Savannah River Site Operator, Westinghouse Savannah River Company, are responsible for engineering development and demonstration. Other participating Laboratories include Brookhaven National Laboratory, Lawrence Livermore National Laboratories, Sandia National Laboratory, Pacific Northwest National Laboratory, Idaho National Engineering Laboratory, Thomas Jefferson National Accelerator Facility, and Oak Ridge National Laboratory.

The APT Prime Contractor (BREI), under a competitive bid cost-plus-incentive fee contract to the Department is responsible for the design of the plant. The Prime Contractor is performing the design with support from the project team, subcontractors, and consultants as necessary.

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[e] The Current Estimate is based on selection of APT as backup to the primary tritium production source. The estimate is the cost of completing preliminary design.

[f] The FY 1998 Budget Request was for design only of the APT plant. This estimate includes the full cost of preliminary and final design, based on preconceptual design estimates. Construction is not included.

[g] Escalation rates taken from the FY 2000 DOE escalation multiplier tables issued with the current budget calls.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design [h]	0	67,865	20,000	31,000	26,000	0	144,865
Total facility costs (Federal and Non-Federal)	0	67,865	20,000	31,000	26,000	0	144,865
Other project costs							
Conceptual design cost [i]	38,611	0	0	0	0	0	38,611
NEPA documentation [j]	3,650	2,000	1,000	0	0	0	6,650
Other ES&H costs [k]	14,139	9,000	2,000	2,000	2,000	2,000	31,139
Other project related costs [l]	128,100	120,251	82,000	55,000	33,000	21,000	439,351
Total other project costs [g]	184,500	131,251	85,000	57,000	35,000	23,000	515,751
Total project costs	184,500	199,116	105,000	88,000	61,000	23,000	660,616

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate [m]	Previous Estimate [n]
Related annual costs		
Total related annual costs	NA	NA

[h] Preliminary design packages will be developed for each major facility subsystem and prototype design will be completed for a few key components needed early in construction

[i] The APT Conceptual Design Report was completed April 1997.

[j] NEPA documentation costs include permitting/licensing, and preparation of the APT Environmental Impact Statement for the Savannah River Site.

[k] Other ES&H costs include the safety analysis/assessments, preliminary safety analysis reports, technical safety requirements, and safety reviews. Necessary environmental, safety and health analysis and documentation will be completed to facilitate rapid start of construction (if needed in the future)

[l] Other project related costs include engineering development and demonstration and program / project management.

[m] Annual operating costs are not applicable to APT as backup.

[n] Annual operating costs are not applicable because the FY 1998 Budget Request was for design only of the APT plant.

97-D-123 Structural Upgrades, Kansas City Plant, Kansas City, Missouri

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left mar gin.)

Significant Changes

- The Total Project Cost (TPC) increases from $19.8 million to $21.2 million due to the application of burden on Other Project Costs (OPC) which previously had not been burdened.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1997 Budget Request (*Preliminary Estimate*)	2Q 1997	3Q 1998	3Q 1998	3Q 2003	18,000	19,800
FY 1998 Budget Request	2Q 1997	3Q 1999	3Q 1998	3Q 2003	18,000	19,800
FY 1999 Budget Request[a]	1Q 1998	3Q 1999	3Q 1998	3Q 2003	18,000	19,800
FY 2000 Budget Request (*Current Baseline Estimate*)	1Q 1998	4Q 1999	2Q 1999	2Q 2003	18,000	21,200

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1997	1,400	0	0
1998	0	1,400	0
1999	6,400	6,400	4,600
2000	4,800	4,800	5,600
2001	5,400	5,400	5,100
2002	0	0	2,000
2003	0	0	700

[a] Reflected baseline changes to ensure that all areas within the Stockpile Restructuring Initiative (SMRI) footprint are repaired/reinforced.

3. Project Description, Justification and Scope

This project is required to correct structural overstress caused by gravity loads and will reinforce masonry walls to resist seismic loading within the DOE controlled portion of the Bannister Federal Complex to ensure life safety. On December 16, 1993, a Kansas City Susceptibility Review and Walkdown was held at the Kansas City Plant by Albuquerque Operations Office, and Headquarters. This review was initiated as a result of a September 1993 report by an outside structural consulting firm that documented two principal areas of concern: existing structural overstresses and numerous unreinforced interior masonry walls. It was determined during the review that the structural overstresses and unreinforced masonry walls findings were an immediate concern.

To provide an immediate response to initiate risk reduction and potential loss of government assets, structural modifications were incorporated into all ongoing projects which appreciably renovated affected areas. Deficiencies in the remainder of the plant not affected by on-going projects are being addressed in this line item submission.

The first part of this line item is required to provide structural overstress relief in accordance with current building code and DOE Order requirements to ensure life safety. This type of overstress is caused by gravity loads (dead loads, live load and snow load) and wind loading only. Overstressed locations will be repaired to reduce the possibility of structural failure and bring the structure into compliance with DOE Orders and codes.

The second part of this line item is required to reinforce masonry walls to resist the seismic loading up to a "500 year event." The existing masonry walls will fall at a "100 year event." Approximately 40 percent of the masonry walls in the DOE controlled part of the Federal Complex (upon completion of the Stockpile Management Restructuring Initiative Line Item) are not reinforced to resist seismic loading. Seismic codes were not in place when the Kansas City Plant was constructed. Potential seismic overstresses have been identified because of the presence of many unreinforced masonry walls added to the building for fire protection purposes. Failure of these walls would constitute a life safety hazard in the event of seismic activity.

The Federal Complex is currently occupied by several Federal Government Agencies. Corrective activities will be performed in DOE controlled areas only, unless an item is identified through the engineering study that would affect both DOE and the General Services Administration. This project will include the following upgrades:

- Column ribs will be post tensioned on end bays to increase bending moment capacity. This will be done by tensioning two steel rods underneath the subject ribs. The rods will be anchored into the end bay roof beam and bolted through to the interior roof beam.
- Selected rib ends will be supported with steel suspenders and long threaded rods through the roof shell or saddles and fastened to the roof beams to increase rib shear capacity and overcome the member strength loss due to existing cracking caused by excessive shear loading.
- Roof shell openings will be reinforced with steel straps adjacent to openings and parallel to the barrel axis. This provides a means of externally reinforcing the thin concrete shell.
- The mezzanine roof slab will be reinforced with intermediate steel beams supported by the concrete roof support beams.

- Supplemental support will be provided to mezzanine concrete roof structure integrity. This would stop further deterioration of the shell.
- Roof shell cracks will be injected with epoxy to reestablish roof structure integrity. This would stop further deterioration of the shell.
- Structural steel blocking will be attached to the roof structure on each side of existing masonry walls. This will eliminate drift during seismic activity and ultimately failure of the walls independent of the remaining structure. This blocking would be spaced approximately 4 feet center to center. The blocking would consist of steel angles fastened to a horizontal surface with the vertical leg of the angle placed against the top of the masonry wall and flat plates fastened to vertical surfaces of the roof structure and lapped down over the top course of the masonry walls.
- Steel strong-backs will be installed adjacent to masonry walls. This strong-back will be a structural tube fixed to the building floor at the bottom of the wall and roof structure at the top. The wall would be bolted to the strong-backs at approximately 4 feet centers. The strong-backs themselves would be on 8 foot centers. This would prevent a tall wall from collapse during a seismic event that produced lateral movement normal to the wall.
- The top of free-standing masonry walls will be supported with roof structure mounted braces. These braces would then be mounted to a steel strut fastened to the roof.

Main Manufacturing Building Overstresses Under Gravity Loading:

- Roof Ribs - 4 percent of the ribs are overstressed.
- Roof Beams - < 1 percent of the beams are overstressed.
- Roof Shell With Openings - 34 percent of the roof shells are overstressed.
- Columns - 0 percent of the columns are overstressed.
- Basement Level Supported Floor Slab - 5 percent of the floor slab is overstressed.
- 2nd Level Supported Floor Slab - 6 percent of the floor slab is overstressed.

Seismic events at KCP can be generated by two faults. The New Madrid Fault is approximately 250 miles east of the Kansas City Plant. The New Madrid fault system extends 120 miles from the area of Charleston, Missouri and Cario, Illinois through New Madrid, Missouri and to Marked Tree, Arkansas. It crosses five state lines and crosses the Mississippi River in three places and the Ohio River in two places. The fault is active, averaging more than 200 measured events per year (1.0 or more on the Richter scale). Tremors large enough to be felt (2.5-3.0 on the Richter scale) are noted annually. Every 18 months the fault releases a shock of 4.0 or more capable of local minor damage. Magnitudes of 5.0 or greater occur about once per decade, can do significant damage, and can be felt in several states. A damaging earthquake along the fault of 6.0 or greater occurs about every 80 years with the last one in 1895. A major earthquake along the fault of 7.5 of greater happens every 200-300 years, with the last one in 1812. A quake of this magnitude would be felt throughout half of the United States. This information is based on a document titled "About the New Madrid Fault" from Southeast Missouri State University Center for Earthquake Studies, David Stewart, Director. The document is undated.

The other fault that could affect the Kansas City Plant is the Humbolt Fault Zone (Nehemma Ridge) located approximately 80 miles west of Kansas City in the Manhattan-Wamego, Kansas area. The largest earthquake that has occurred in Kansas is a probable Richter magnitude of about 5.2-5.3, which occurred in 1867 and events of this size can be expected to occur every 100 years. An earthquake of Richter magnitude 6.0-6.5 at this fault is likely to occur on average once in about 1000 years. This information is based on a document titled "Kansas Geological Survey" from the University of Kansas on October 10, 1990 by Don W. Steeples, Ph.D., Seismologist and Deputy Director.

In March 1994, the KCP was placed in performance Category 1, based on an extensive study of mission dependency of specific KCP operations, Production Risk Evaluation Program, and the hazard assessment in the Site Safety Assessment. This recommendation was agreed to by KCAO, AL, DOE-HQ, and AlliedSignal. A site specific Seismic Hazard Analysis was performed during the first quarter of FY 1994 by DOE-HQ for the KCP. This resulted in a reduction of the seismic zone factor from 0.15g to 0.06g. The Design Basis Earthquake (DBE) of 0.06g is comparable to a 500-year event. The former values are required by the 1994 Uniform Building Code for Zone 2A where the KCP is located. The lower seismic zone factor resulted in significant reduction in the calculations used in the analysis and has been taken into account in the cost estimate. The existing masonry walls are currently protected to a 100-year event.

The applicable DOE Orders and Codes that apply to this project are as follows:

- DOE Order 420.1, "Facility Safety."
- Executive Order 12941 "Seismic Safety of Existing Federally Owned or Leased Buildings."
- The American Institute of Steel Construction (A.I.S.C.), American Concrete Institute (A.C.I.), and Uniform Building Code (UBC) define analysis and design requirements for corrective actions.

The consequence of not funding this line item is a continued life safety risk due to structural overstresses and, in the event of seismic activity, potential failure of unreinforced masonry walls. This project is in accordance with current mission needs and is being coordinated with the Stockpile Management Restructuring Initiative.

Project Milestones

FY 1998: A-E work initiated

FY 1999: A-E work completed

Physical construction starts

FY 2000: Maintain schedules to complete physical construction by 2Q 2003

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	1,626	815
Design Management Costs (2.8% of TEC)	504	252
Project Management Costs (0.3% of TEC)	49	25
Total Design Costs (12.1% of TEC)	2,179	1,092
Construction Phase		
Buildings	10,830	10,830
Standard Equipment	360	360
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	918	1,660
Construction Management (4.7% of TEC)	842	842
Project Management (1.1% of TEC)	195	471
Total Construction Costs (73.0% of TEC)	13,145	14,163
Contingencies		
Design Phase (0.7% of TEC)	131	200
Construction Phase (14.1% of TEC)	2,545	2,545
Total Contingencies (14.9% of TEC)	2,676	2,745
Total, Line Item Costs (TEC) [b]	18,000	18,000

Overhead rates were calculated at a factor of 14 percent for procurement and 77 percent for internal labor.

5. Method of Performance

Design and inspection shall be performed under an AlliedSignal-negotiated architect-engineer subcontract. Construction will be accomplished by fixed price subcontracts awarded after competitive proposals and administered by AlliedSignal.

[b] Escalation rates taken from the FY 1997 DOE escalation multiplier tables. Escalation rates are calculated to the midpoint of each activity.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project cost							
Total facility Cost							
Design	0	0	2,000	310	0	0	2,310
Construction	0	0	2,600	5,290	5,100	2,700	15,690
Total facility costs (Federal and Non-Federal)	0	0	4,600	5,600	5,100	2,700	18,000
Other project costs							
Conceptual design cost	110[c]	0	0	0	0	0	110
Other project-related costs	360	350	420	420	600	940	3,090
Total other project costs	470	350	420	420	600	940	3,200
Total Project Cost (TPC)	470	350	5,020	6,020	5,700	3,640	21,200

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project--30 years)		
Total related annual funding (operating from FY 2003 through FY 2032)	0	0

[c] Pnor years cost of $615,000 was in error and should have been shown as $110,000 on the FY 1999 Congressional Budget Request.

95-D-102, CMR Upgrades Project, Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	Title I & II A-E Work Initiated	Title I & II A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1995 Budget Request [a]	1Q 1992	1Q 1997	3Q 1993	4Q 2003	194,750	204,000
FY 1996 Budget Request	1Q 1992	1Q 1997	3Q 1993	4Q 2004	194,750	204,000
FY 1997 Budget Request	1Q 1992	1Q 1999	3Q 1993	4Q 2002	174,100	223,635
FY 1998 Budget Request	1Q 1992	1Q 1999	3Q 1993	4Q 2002	174,100	223,635
FY 1999 Budget Request	1Q 1992	1Q 1999	3Q 1993	4Q 2002	174,100	223,635
FY 2000 Budget Request *(Current Baseline Estimate)*	1Q 1992	1Q 1999 [b]	3Q 1993	4Q 2004 [c]	174,100 [c d]	223,635

[a] Prior to FY 1995, CMR Upgrades Phase 1 was a subproject within Nuclear Weapons Research Development and Testing Facilities Revitalization, Phase III (90-D-102). In FY 1995, Phase 1 was segregated and the scope of Phases 2 and 3 were added to create this stand alone line item.

[b] Title I activities have been completed for all Phase 1 subprojects. Phase 2 subproject Title I activities were ongoing when the project was placed on hold, and Title I baselines have not been established.

[c] Project has been restarted to address safety and reliability requirements as an outcome of the facility; Basis for Interim Operations (BIO) Review and Associated Technical Safety Requirements (TSRs).

[d] Phase 2 CDR baseline estimate.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1992	18,250 [e]	18,250	2,757
1993	10,000	10,000	5,061
1994	10,250	10,250	10,504
1995	3,300	3,300	13,363
1996	10,940 [f]	10,940	14,909
1997	15,000	4,000	10,081
1998	5,000 [g]	10,800	2,813
1999	5,000 [h]	10,200	14,729
2000	18,000 [i]	18,000	19,729
2001	20,450	20,450	21,179
2002	20,900	20,900	20,900
2003	19,800	19,800	19,800
2004	17,210	17,210	18,275

3. Project Description, Justification and Scope

The project has been restarted to address safety and reliability requirements as an outcome of the facility Basis for Interim Operation (BIO) review and associated Technical Safety Requirements (TSRs). Ongoing programmatic reviews and incorporation of corrective actions and lessons learned from Phase 1 Assessments will be utilized to ensure that required upgrades will be completed within current TEC of $174,100,000.

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[e] $6,250,999 was reprogrammed to CMR, Phase 1 subproject of Nuclear Weapons Research, Development and Testing Facilities Revitalization Phase 3 (90-D-102) from Special Nuclear Materials Laboratory Replacement Project (88-D-105). Reprogramming 91-R-14 was executed in FY 1992.

[f] $1,000,000 was reprogrammed by DOE Internal Reprogramming to the CMR Upgrades Project (95-D-102) in the 1st Qtr. FY 1996 from Special Nuclear Materials Laboratory Replacement Project (88-D-105).

[g] Congress provided appropriations below the original request ($15,700,000) based on DOE input relating to estimated impact of project suspension.

[h] FY 1999 funding reduction from that presented in the FY 1998 CPDS is based on suspension and restart activities and Congressional reductions Funding in FY 1999 will be applied to Phase 1 design construction and Phase 2 design work.

[i] The FY 2000 funding request will be applied to ramp-up of construction projects supporting Basis for Interim Operations (BIO), safety systems, and Phases 1 and 2 design and construction. The FY 2000 funding of $18.0 million is based on current need requirements.

The Chemistry and Metallurgy Research (CMR) Building is the largest structure at the Los Alamos National Laboratory (550,000 square feet). Construction of the CMR Building was completed in 1952. Most of the major mechanical and electrical equipment has reached the end of its design life.

Since its construction over 40 years ago, the CMR Building has been used for research, development, and analytical work with plutonium, uranium and their alloys, and other materials in support of weapons, nuclear materials, and other Laboratory programs. This work continues to be essential to the nation's weapons program, with the principal activities in the building being in support of the plutonium research, development, and demonstration activities conducted at the Laboratory's Plutonium Handling Facility at TA-55. The activities that are critical to these plutonium operations are:

- Essential daily analytical chemistry and metallurgical services on plutonium and other actinides.
  - Analyses of plutonium metal preparations for the Laboratory's Weapons Research, Development, and Test Programs.
  - Analyses required for development and demonstration of new and improved processing methods for scrap recovery.
  - Analyses required for accountability and verification of material received or shipped and for on-site transfers.
- The CMR Building future role is also essential for support of several major Defense Programs areas which include:
  - Enhanced Safety and Reliability of Nuclear Weapons
  - Lead Technical Laboratory for Pu and U Processing
  - Weapons Dismantlement and Component Storage
  - Materials Disposition
  - Nonproliferation
  - Pit Production

The primary purpose of this project is to upgrade facility systems and infrastructure that have been in continuous operation for over 40 years and are near the end of their useful life. Such upgrading will ensure the continued safety of the public and Laboratory employees and increase the operational safety, reliability and security of essential activities. Increased safety, reliability, and security are critical to the continued operation of the Laboratory's Stockpile Management Programs and other national defense programs.

The Special Nuclear Materials Laboratory (SNML) Project was authorized (88-D-105) to replace the CMR Building at Los Alamos National Laboratory. In FY 1990, the project was put on hold pending a substantive review of the project including other potential options for providing the necessary specialized Laboratory space. As the planned completion date of the SNML continued to be pushed back, it became necessary to provide interim upgrades to CMR to allow its safe and reliable use;

$6,250,000 was reprogrammed (91-R-14, executed in FY 1992) from the SNML line item to Project 90-D-102, Nuclear Weapons Research, Development and Testing Facilities Revitalization, Phase 3 (WRD&T Revit., 3), subproject CMR Upgrades (Phase 1). Later in FY 1991, it was decided not to proceed with the construction of SNML but provide interim upgrades to CMR (Phase 1) and to identify further upgrades based on safety and risk assessment, for continued long-term operations. The result of these safety and risk assessments is an Interim Safety Analysis Report (ISAR). The findings of the ISAR are the basis for the scope of CMR Upgrades Phase 2, which was combined with Phase 1 to produce this stand alone line item in FY 1995.

The ISAR includes an analysis of risks associated with natural phenomena design basis accidents, current operations, and comparison to DOE Design Criteria (6430.1A). The ISAR was utilized as the basis to identify and prioritize upgrades that would be required to continue operations in a safe, secure, and reliable manner for at least the next 20 years.

CMR Phase 1 Upgrade

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$51,600	$ 51,000	$ 600	$ 0	$ 0	$ 0	$ 0	3Q 1993 - 4Q 1999 [j]

Phase 1 was formerly part of WRD&T Revitalization, Phase III with a TEC of $49,500,000. Based upon the 1995 baseline change proposal and the completion of the CDR, the TEC changed to $51,600,000 and completion date changed from 3rd Qtr. FY 1996 to 3rd Qtr. FY 1999.

Phase 1 of this project consists of required and urgent capital equipment replacements and upgrades in the CMR Building. Individual tasks were initially identified by a panel commissioned by the Deputy Assistant Secretary for Military Application (DASMA) in July 1990, as the minimum essential effort required to maintain operations in the CMR Building while a Safety Analysis Report (SAR) was prepared.

The equipment replacements and upgrades included:

- **Continuous Air Monitor (CAM) Installations**
  Install a new CAM system in the Wings 3, 5, 7, and 9 laboratories. Upgrades include installation of CAMs, Fixed head Air Samplers (FAS), and glovebox hand monitors as required by DOE Order 5480.11 and AR 3-7. Remote monitoring capabilities at the Health Physics office and a data logging system are also included. Existing vacuum systems in Wings 3, 5, and 7 will be utilized while the vacuum system in Wing 9 will be expanded.

[j] Phase 1 Upgrade Project has been restarted to address safety and reliability requirements as an outcome of the facility; Basis for Interim Operations (BIO) Review and Associated Technical Safety Requirements (TSRs).

- **HVAC Blowers and Motors**
  Replace existing laboratory exhaust fans in the CMR Building and provide vibration analysis for approximately twenty exhaust fans in the CMR Building. Immediate needs are to replace the 200 HP exhaust fans on the first floor of the filter towers in Wings 3, 5, and 7. Other exhaust fans may require replacement contingent on the scope of the Phase 2 Confinement Zone Separation upgrade.

- **Electrical Upgrades**
  The Distribution Analysis and Power Planning Evaluation and Reporting (DAPPER) software will be used for analysis, calculations, and record drawings for all electrical upgrades. Provisions to incorporate a future facility computer monitoring and limited control system will be provided as part of the Electrical Upgrades.

  Exterior Electrical Upgrades: Replace inadequately sized exterior sectionalizing switches, eliminate existing exterior single point failures, modify exterior underground electrical system to allow switching and maintenance functions, upgrade existing controls and correct deficiencies to the existing administration wing, and Wings 1, 3, 4, and 9 substations.

  Substations Upgrade: Replace substations in Wings 2, 5, and 7.

  Wing Electrical Upgrades: Upgrade the interior low voltage power distribution system for all wings except 2 and 4 in the CMR Building. This includes the replacement of power and lighting panel boards, laboratory power panel boards, bus ways, motor control centers, replacement of all obsolete branch and feeder wiring systems, rewiring of laboratories, and upgrading the emergency and exit lighting systems.

  Electrical Upgrades to Support Safe Standby, Wings 2 and 4: Upgrade the interior low voltage power distribution system in Wings 2 and 4, which is necessary for safety systems.

  Spinal Corridor Cable Tray: Provide a cable tray system in the attic spinal corridor.

  Grounding and Lightning Protection: Upgrade the CMR Building grounding and lightning protection systems.

- **Stack Monitors Upgrade**
  Provide a stack effluent monitoring system for the CMR Building that is in compliance with DOE and EPA requirements. Each stack will be evaluated to determine the type of monitoring required. Each stack system will be stand alone, consisting of in-line samplers, CAMS, vacuum pumps, and associated tubing, wiring, and signal processing equipment. This upgrade also

includes a data collection system from all of the stack CAM's to the CMR operations room and the ES&H operations room. The stack effluent monitoring will be in compliance with 40 CFR 61 and DOE Order 6430.1A.

- **Uninterruptable Power Supply (UPS) Installation**
  This Upgrade is in support of the Stack Monitors Upgrade. There will be one UPS supporting the stack monitoring data collection computer systems. The UPS will be capable of providing backup power to the stack effluent monitoring systems for a 4 hour period.

- **Duct Modification**

  Backdraft Dampers: Provide positive shutoff intake backdraft dampers in the supply air ductwork in Wings 2, 3, 4, 5, 7, and 9.

  Duct Washdown Upgrade: Upgrade the existing exhaust duct washdown system in Wings 3, 5, and 7. This includes replacement of piping, valves, and spray heads and installation of new flow measurement devices.

- **Sanitary Sewer Upgrades**
  This subproject was completed 3rd Quarter of FY 1994.

- **Acid Vents and Drains Upgrades**
  Aging piping and a lack of gradient in the acid drain system in the basement of the CMR Building has led to corrosion and clogging of the system. This upgrade includes evaluation and documentation of the existing system, prioritization of the system deficiencies, and cost estimates to correct each deficiency for Wings 3, 5, and 7. Construction will include replacement of piping and components including threaded nipples, fittings, valves, flanged fittings, and gaskets with compatible new components. Remaining system replacement will be incorporated in Phase 1.

- **Fire Hazard Analysis (Formerly Fire Protection Upgrades)**
  This subproject was completed in the 2nd Qtr. FY 1996.

- **Safety Analysis Report**
  This subproject was completed in the 4th Qtr. FY 1995.

- **Engineering Assessments/CDR/EA**
  Engineering Assessment--This project was completed 2nd Qtr. FY 1996.
  An environmental assessment, including all aspects of Phase 2, has been prepared and approval based upon the conceptual design report. This EA assessed the environmental impact of construction as represented by the Phase 2 scope of work.

CMR Phase 2 Upgrade
The Phase 2 components are needed to maintain infrastructure, improve safety for public and workers and enhance environmental management.

TEC	Previous	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$122,500	$ 6,140	$ 4,400	$ 5,000	$ 18,000	$ 20,450	$ 68,510	2Q 1997 - 4Q 2004 [h]

Based upon completion of the CDR for the Phase 2 scope, the TEC for this phase was increased from $85,000,000 to $122,500,000. The construction start date changed from 2nd Qtr. FY 1996 to 2nd Qtr. FY 1997 and the end date changed from 4th Qtr. FY 2003 to 4th Qtr. FY 2004.

The scope of the following subprojects is being reviewed in FY 1998 based on ongoing programmatic evaluations and incorporation of corrective actions and lessons learned from the Phase 1 assessments to ensure that required upgrades will be completed within the current TEC of $174,100,000.

The additional long term upgrades developed by the Phase 2 CDR process are:

- **Seismic and Tertiary Confinement (Wings 3, 5, 7, and 9)**
  Structural strengthening to meet the seismic criteria for hazard Category 2 operations. Modification of the existing exterior structural openings in these wings to create a tertiary confinement barrier. Structural strengthening of the Administration Wing (which houses the Operations Center) to meet the seismic criteria for worker safety. Hardening of building openings to security requirements which are also being modified for tertiary confinement. These openings include doors, windows, louvers, etc.

- **Ventilation and Confinement Zone Separation (Wings 3, 5, 7, and 9)**
  Renovate the mechanical systems and the related control systems to replace components that are near the end of their useful lives and to improve confinement zone separation throughout each Wing. Architecturally modifying Wings 3, 5, and 7 to create a secondary confinement barrier.

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[c] Project has been restarted to address safety and reliability requirements as an outcome of the facility; Basis for Interim Operations (BIO) Review and Associated Technical Safety Requirements (TSRs).

[i] The FY 2000 funding request will be applied to ramp-up of construction projects supporting BIO, safety systems, and Phases 1 and 2 design and construction. The FY 2000 funding of $18.0 million is based on current need requirements.

[h] FY 1999 funding reduction from that presented in the FY 1998 CPDS is based on suspension and restart activities and Congressional reductions. Funding in FY 1999 will be applied to Phase 1 design construction and Phase 2 design work.

Providing an alarm for each enclosure to alert workers when the mechanical systems are not operating according to safety standards for the facility. Providing a central, chilled water plant to support the mechanical systems' renovations to the building.

- **Standby Power (Wings 3, 5, 7, and 9)**
  Provide standby electrical power to operate the most important mechanical systems at a reduced level sufficient to maintain negative pressure in the laboratory enclosures. This will reduce possibility of spread of contamination due to the loss of offsite power to the ventilation system.

- **Communications (Wings 3, 5, 7, and 9)**
  Improve emergency communications systems thereby improving worker safety.

- **Wing 1 (HVAC) Upgrades/Wing 1 Interim Decontamination**
  Decontaminate the unoccupied, contaminated laboratories in Wing 1, modifying the HVAC exterior intake and exhaust locations for Wing 1 to improve worker health and safety.

- **Operations Center (Administration Wing)**
  Improve the ergonomics and reliability of the building's central monitoring and control capabilities. Install transfer capability and wiring from the standby power generator to the CMR Operation Center to support all functions or systems required to recover the facility after significant accidents.

- **Process Chilled Water (Wings 3, 5, and 7)**
  Replace the 2 existing 40 year old evaporative coolers in each Wing with a single refrigeration unit to provide chilled water for process equipment. Also, replace the existing 40 year old process chilled water piping system with a new piping system.

- **Main Vault**
  CAMs - Install new Canberra CAMs in the vault, ASM 2000 controllers in the anteroom, and incorporate remote monitoring (similar to Wing CAM systems) to the ES&H office. This upgrade would utilize the generic design established for the Wing CAMs.

- **Acid Vents and Drains (Wings 3, 5, and 7)**
  Correct deficiencies not covered in Phase 1 upgrades (Phase 1 addresses major leaks and flanges). Correct area with inadequate slope, replace branches and risers to laboratories as required, and upgrade the ventilation of the system.
- **Fire Protection Upgrades (Entire Facility)**
  Correct fire protection system deficiencies as identified in the 1992 NFPA 101 analysis, and the Fire Hazard Analysis completed in Phase 1. Deficiencies will be prioritized in a cost benefit analysis which will be completed in Phase 1. Examples of current identified deficiencies are: Add check valves in fire protection risers, add backflow preventors in the sprinkler system, provide fire dampers in duct penetrations, replace fire alarm panels.

- **Exhaust Duct Washdown Recycling System (Wings 3, 5, and 7)**
  This recycling system will significantly reduce the waste stream from the facility. The reduction in the waste stream will reduce the demands on the current waste treatment plant.

- **Wings 2 and 4 Safe Standby**
  This upgrade includes the costs necessary to establish a safe standby condition for Wings 2 and 4 pending future programmatic use. Included are identification of safety systems required for safe standby deactivation/decontamination of abandoned systems and gloveboxes, removal of all radioactive materials and chemicals, and removal or stabilization of all loose contamination.

- **ES&H Support Activities**
  Additional enhanced ES&H support activities based on the lessons learned from Phase 1 are being incorporated. These efforts include waste management, waste minimization, ES&H support, risk analysis, and ES&H equipment including personnel protective equipment.

Project Milestones

FY 1999: Start -	Phase 1 - Stack Monitors
	Phase 1 - Ductwork (Duct Washdown)
	Phase 2 - Portion of Fire Protection (Fire Alarm Panels, Combustible Loading) [k]
	Phase 2 - Portion of Wings 2 and 4 Safe Standby (HVAC DP Indicators)
	Phase 2 - Portion of Ventilation and Confinement Zone (HVAC DP Indicators, Wing 9 Ventilation, Air Compressors) [k]
	Phase 2 - Portion of Communications (EPAS) [k]

[k] Activities to be completed per the Technical Safety Requirements (TSR) Implementation Plan schedules.

	Complete -	Phase 1 - Ductwork (Duct Washdown) Phase 2 - Portion of Fire Protection (Fire Alarm Panels, Combustible Loading) [k] Phase 2 - Portion of Wings 2 and 4 Safe Standby (HVAC DP Indicators) [i] Phase 2 - Portion of Ventilation and Confinement Zone (HVAC DP Indicators, Air Compressors) [k] Phase 2 - Portion of Communications (EPS) [k]
FY 2000:	Start -	Phase 1 - Sanitary Sewer Phase 1 - Acid Vents and Drains Phase 1 - Continuous Air Monitors Phase 1 - Electrical Phase 1 - Power Distribution Phase 1 - Fire Protection Phase 2 - Portion of Ventilation and Confinement Zone (HVAC Testing and Balancing, Controls Upgrades)
	Complete -	Phase 1 - Sanitary Sewer Phase 1 - Acid Vents and Drains Phase 1 - Stack Monitors Phase 1 - Continuous Air Monitors Phase 1 - Fire Protection Phase 2 - Portion of Ventilation and Confinement Zone (Wing 9 Ventilation, HVAC Testing and Balancing)

[k] Activities to be completed per the Technical Safety Requirements (TSR) Implementation Plan schedules.

[i] The FY 2000 funding request will be applied to ramp-up of construction projects supporting BIO, safety systems, and Phases 1 and 2 design and construction. The FY 2000 funding of $18.0 million is based on current need requirements.

Subproject Detail [j] - PHASE 1

	PM&S	ED&I	CONST	STD EQUIP	CONTING	TEC
Subprojects						
Phase 1						
CAM Installation	536	718	1,447	1,274	204	4,179
HVAC Blowers & Motors	116	129	426	176	56	903
Electrical Upgrades	3,443	4,815	14,832	1,831	1,913	26,834
Stack Monitors Upgrades	430	1,467	704	643	112	3,356
Ductwork Mods.	242	271	1,218	0	153	1,884
Sanitary Sewer Mods.	21	71	68	0	0	160 [m]
Acid Vents & Drain Mods.	193	577	651	0	86	1,507
Fire Hazard Analysis (formerly Fire Protection Upgrades)	299	0	0	0	15	314 [o]
Safety Analysis Report	2,525	0	0	0	0	2,525 [o]
Environmental Assessment	1,273	0	0	0	69	1,342 [o]
UPS Installation	77	177	304	0	39	597
Engineering Assessment/ Phase 2 Planning	1,284	1,669	0	0	0	2,953 [n]
CDR	678	4,111	0	0	257	5,046 [o]
Phase 1 Subtotal	11,117	14,005	19,650	3,924	2,904	51,600

[j] The estimates do not include site overhead/landlord costs since FY 1992 was the first year of project funding.

[m] Completed subproject or task.

[n] Additional Engineering Planning/Assessments may be required pending completion of the DOE and LANL assessments.

[o] CDR and Environmental Assessment costs are carried as part of the Phase 1 Engineering Activities/Phase 2 Planning Activities and are broken out for clarity.

Subproject Detail - PHASE 2

	PM&S	ED&I	CONST.	STD EQUIP	CONTING.	TEC
Subprojects						
Phase 2						
Seismic & Teritary Confinement	4,028	2,855	6,715	0	1,947	15,545
Ventilation & Confinement Zone Separation	17,791	8,358	34,176	0	8,326	68,651
Standby Power	1,534	1,070	2,596	0	717	5,917
Communications	1,076	926	1,243	250	657	4,152
Wing 1 HVAC Upgrades & Decontamination	167	73	326	0	78	644
Operations Center	425	391	625	0	199	1,640
Process Chilled Water	1,119	746	1,734	0	720	4,319
Main Vault	187	268	180	0	88	723
Acid Vents & Drains	2,066	709	3,782	0	1,414	7,971
Fire Protection	1,114	363	2,300	0	521	4,298
Exhaust Duct Washdown Recycle	303	255	468	0	142	1,168
Wings 2 & 4 Safe Standby	1,937	784	3,845	0	906	7,472
Phase 1 Subtotal	11,117	14,005	19,650	3,924	2,904	51,600
Phase 2 Subtotal	31,753	16,798	57,990	250	15,715	122,500
Total Estimated Cost	42,870	30,803	77,640	4,174	18,619	174,100

Engineering, design, and inspection cost-of-services were estimated from historical records and experience with drawing and man hour requirements established for each discipline, ED&I represents approximately 15 percent of TEC. ED&I costs captured in Phase 1 included Phase 2 planning and CDR development for Phases 1 and 2. Phase 2 ED&I represent approximately 17.7 percent of Phase 2 TEC.

Contingencies represent approximately 10.7 percent of TEC. The contingency rate is the result of a contingency analysis of various items based on relative risk ratings compared to ratings of relative importance of a particular item to the project. The analysis of various items results in different contingency rates depending on the item. The contingency rate shown here is an average rate resulting from the contingency analysis and weighing according to the item's relative cost.

4. Details of Cost Estimate [l] [p]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design and Management Costs		
Preliminary and Final Design Costs (Drawings and Specifications)	25,989	25,989
Design Management Costs (2.7% of TEC)	4,814	4,814
Project Management Costs (6.7% of TEC)	11,744	11,744
Total Design Costs (24.4% of TEC)	42,547	42,547
Construction Phase		
Special Equipment	77,640	77,640
Other Structures	4,174	4,174
Construction Management (3.1% of TEC)	5,391	5,391
Project Management (14.7% of TEC)	25,729	25,729
Total Construction Costs (64.9% of TEC)	112,934	112,934
Contingencies		
Design Phase (2.9% of TEC)	5,031	5,031
Construction Phase (7.8% of TEC)	13,588	13,588
Total Contingencies (10.7% of TEC)	18,619	18,619
Total, Line Item Costs (TEC) Phase 1 and Phase 2 [q]	174,100	174,100

5. Method of Performance

Procurement will be accomplished under fixed-price subcontracts awarded on the basis of competitive bidding. Consideration will be given to cost-plus-fixed fee on decontamination and refurbishment work on the CMR. Upgrades construction will be done by fixed price contractors and the Laboratory's support services subcontractor. The operating contractor and contracted Architect-Engineers will perform construction inspection.

6. Schedule of Project Funding

(dollars in thousands)

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[l] The estimates does not include site overhead/landlord costs since FY 1992 was the first year of project funding.

[p] Project management and contingency were prorated based on the ratio of total design (27.4%) and construction (72.8%) costs. Previously project management and contingency were not required to be broken out by the design phase and the construction phase when the project was baselined.

[q] Escalation rates taken from the FY 1995 DOE escalation multiplier tables.

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project costs							
Total facility costs							
Design	36,505	600	1,700	2,500	3,000	3,273	47,578
Construction	20,170	2,213	13,029	17,229	18,179	55,702	126,522
Total facility costs (Federal and Non-Federal)	56,675	2,813	14,729	19,729	21,179	58,975	174,100
Other project costs							
Other project-related costs	11,268	1,700	2,000	2,000	2,000	30,567	49,535
Total other project costs	11,268	1,700	2,000	2,000	2,000	30,567	49,535
Total Project Cost (TPC)	67,943	4,513	16,729	21,729	23,179	89,542	223,635

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–40 years)		
Facility operating costs	10,000	10,000
Facility maintenance and repair costs	2,500	2,500
Programmatic operating expenses directly related to the facility	30,000	30,000
Capital equipment not related to construction but related to the programmatic effort in the facility	1,000	1,000
GPP or other construction related to the programmatic effort in the facility	1,000	1,000
Utility costs	2,450	2,450
Total related annual costs (operating from 2004 through FY 2043)	46,950	46,950

88-D-123 Security Enhancements, Pantex Plant, Amarillo, Texas

(Changes from FY 1996 Significant Changes Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

- FY 2000 funding request to increase project total estimated cost (TEC) by $6,200,000.
- Extend the project completion from 4th quarter FY 1998 to 4th quarter FY 2000.
- Increase the other project costs (OPC) costs associated with the schedule extension.

1. Construction Schedule History [a]

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1988 Budget Request *(Preliminary Estimate)*	1Q 1988	2Q 1992	2Q 1988	1Q 1994	109,700	114,700
FY 1989 Budget Request	1Q 1988	2Q 1992	2Q 1988	3Q 1994	109,700	114,700
FY 1990 Budget Request	2Q 1988	2Q 1992	4Q 1988	4Q 1995	109,700	114,700
FY 1991 Budget Request	2Q 1988	2Q 1992	4Q 1988	3Q 1996	109,700	114,700
FY 1992 Budget Request	3Q 1988	3Q 1994	4Q 1988	3Q 1996	109,700	114,700
FY 1994 Budget Request	3Q 1988	1Q 1995	3Q 1990	4Q 1997	125,000	130,000
FY 1995 Budget Request	3Q 1988	4Q 1995	3Q 1990	4Q 1997	125,000	130,000
FY 1996 Budget Request	3Q 1988	4Q 1995	3Q 1990	4Q 1997	125,000	130,000
FY 1997 Budget Request	3Q 1988	4Q 1995	3Q 1990	4Q 1997	125,000	130,000
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1988	3Q 1996	3Q 1990	4Q 2000	131,200	143,600

[a] No Construction project data sheet was included with the budget requests for FY 1993, FY 1998 and FY 1999.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design/Construction			
1988	5,700	5,700	69
1989	7,500	3,500	2,586
1990	5,417	2,417	3,514
1991	18,244	23,701	8,407
1992	30,000	30,692	15,042
1993	0	372	9,700
1994	20,000	1,862	10,647
1995	15,000	21,707	20,015
1996	13,400	20,992	21,896
1997	9,739	5,922	14,867
1998	0	2,786	6,568
1999	0	4,849	7,479
2000	3,500	3,500	7,000
2001	2,700	3,200	3,420

The Security Enhancements Project was initiated in 1988 to address security risks at Pantex. Twelve subprojects were identified to address these risks. The project is currently 94 percent complete, with ten of the twelve subprojects 100% complete, and an eleventh fully funded. The project is currently in the final stages, activation and cut over to the new system.

This project has seen a cost growth of about $9.0 million due to enhanced mission criteria, directed scope changes, and software development cost overruns. Actions have been taken to manage spending and control costs within the existing funding limits. However, an additional $6.2 million is required to finish the project.

The funding increase will assure successful activation of the Electronic Enhancements subproject and complete procurement and installation of the Aircraft Detection System (ADS). ADS is a high security priority and will reduce security costs by $1.5 million per year.

Discussion:

The SEP is currently ninety-four (94) percent complete, of which ten (10) of the twelve (12) subprojects are 100% complete and operational. The remaining subprojects to be completed are Security Command Center Expansion, and the Electronic Enhancements subproject which includes the Aircraft Detection System (ADS). In reference to the open subprojects, the Security Command Center Expansion subproject is ninety-three (93) percent complete and fully funded with the remaining activity contingent upon the demolition of the existing security system, scheduled for the end of the project. The Electronic Enhancements Subproject is eighty-eight (88) percent complete with ninety-five (95) percent of the hard construction activity completed. The remaining activities are primarily associated with the validation/cut over of operations from the old system to the new ARGUS system, and the procurement

and installation of the ADS. If no additional funds are provided, the site will be required to accept risk and higher operational costs, estimated to be a minimum of $1.5 million per year.

The shortfall has resulted from the need to support changed requirements and costs associated with LLNL.

- In January 1995, the DP Baseline Change Control Board approved BCP04, providing $2.5 million in support of the SNM Component Facility Backfit activity to reconfigure the vaults to "stage right", to be consistent with operations in Zone 4 and the upgrades in design to meet DOE Order 6430.1A non-reactor nuclear facility requirements.
- March 1996, the DP Baseline Change Control Board rejected the project's request for $2.5 million to address directed changes. The Board approved the required work be incorporated through the use of contingency funds. Electronic Enhancements project contingency was decremented $1.5 million to address changed Life Safety Code/Security requirements. Other subproject funds were decremented to address an increase in capability to store Strategic Reserve Pits.
- $5.0 million has been reallocated to cover software development cost overruns by LLNL. Several factors have contributed to these overruns. The system is "technologically advanced" and has resulted in a higher number of technical issues to be resolved than anticipated by LLNL, as part of the system development. Another contributing factor was the unavailability of a factory test bed large enough to prove functionality before being installed in the field at Pantex. This has resulted in a higher number of unforeseen software problems and configuration issues requiring LLNL resolution to meet security requirements and functionality.

In conclusion, the Security Enhancement Project has been conscientiously managed within the TEC funding level of $125 million. $9.0 million of $13.6 million in increased scope requirements and cost overruns have been absorbed within previously appropriated funds. It should be understood that the complexity of the Pantex environment provides a worst case test bed for this project as all modules are being implemented at this site. Successful implementation at the Pantex site should provide lessons learned in assuring a high probability of successful implementation at other sites.

3. Project Description, Justification and Scope

This project identifies subprojects required to enhance the Pantex security posture.

These subprojects reflect the best security enhancement from information and emphasis known to date. The scope and priority of each subproject is subject to subsequent revision to reflect the results of further vulnerability assessments, field exercises, and inspections and management direction. This is required to assure that the results of further threat scenario analysis are considered in the actual implementation of the subprojects. The project costs reflect this.

The Production Zone (Zone 12 South), the Special Nuclear Material (SNM) Isolation Area, the Staging Area (Zone 4 West), and the general site include projects which enhance Pantex physical protection, detection alarm assessment, SNM facilities, safeguards of SNM, access control, and security training.

Each subproject includes associated site work for drainage, roads, parking, and utilities. Also included are foundations, walls, roofs, doors, windows, water, sewer, HVAC mechanical equipment, fire protection, alarms, lights, and electrical power to make it functional and satisfy general facility design requirements.

a. Subproject 01 - SNM Component Staging Facility

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$24,531 [b]	$22,300	$0	$0	$0	$0	$0	1st Qtr FY 1991-2nd Qtr. FY 1998

This subproject is complete. Authorization for facility operation was issued July 1998.

b. Subproject 02 - Protected Area Enhancements

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 2,834 [b]	$ 4,600	$0	$0	$0	$0	$0	3rd Qtr FY 1990-2nd Qtr FY 1991

This subproject is complete. Key Decision 4 was issued September 1992.

c. Subproject 03 - Electronic Enhancements

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$81,183 [c]	$74,270	$0	$0	$3,500	$2,700	$0	4th Qtr. FY 1993-4th Qtr FY 2000

This subproject is for the replacement and enhancement of electronic security systems at the Pantex Plant. This subproject includes a Closed-Circuit Television Surveillance System, an Aircraft Detection System, and a Compartmentation and Security Alarm System Upgrade. Major systems to be included are: the

[b] Current TEC reflects final subproject costs

[c] Estimated cost at project completion

PIDAS in Zones 4 and 12, the Interior Security Alarm Systems (ISAS), the Compartmentation, and the Aircraft Detection System (ADS). Other systems required to support the above include: Closed-Circuit Television (CCTV) systems, telecommunications, computerized processing systems, and operator interface consoles located in the Security Command Center (SCC); and the Alternate Command Post (ACP). The other subprojects, integrated into the above security systems, are Radio Communications equipment, and procurement and installation of PPIV, both integrated with Security Alarm System upgrades (Argus Access Control).

This subproject is to accomplish several tasks. Upgrading and enhancing the alarm systems include the responsibility to integrate as well as to modernize. Secured radio broadcasts will add to the security effectiveness at Pantex. Following are the detailed justifications:

- PIDAS: The existing PIDAS in Zones 4 and 12 have been in place for several years. Both systems have aged and are increasingly difficult to maintain. As a first line of defense against intruders into SNM areas and as a means of detecting insiders attempting to escape with stolen material, it is important for PIDAS to perform as well as possible.
- ISAS: The Interior Security Alarm Systems (ISAS) are also several years old and are of many incompatible varieties. The ISAS will be replaced with a single integrated system providing a composite risk reduction of 2-3 orders of magnitude, a single-man-machine interface, a single maintenance program and the reliability of a redundant system.
- ADS: The Aircraft Detection System (ADS) is required in order to detect the intrusion of rotary or fixed wing aircraft into the plant. The topographical features of the Pantex Plant include flat, treeless terrain with no tall buildings. Such terrain does not inhibit low flying or landing aircraft.
- Radio Communications: Construction of this activity was completed March 1998.
- Compartmentation: Compartmentation provides additional protection against the outsider and reduces the risk against the insider. To the outside, Compartmentation offers another obstacle and at the very least an additional delay because each work area becomes a vault which is in a locked condition. To the insider, Compartmentation is a deterrent that makes it harder to accomplish his goal. To security, Compartmentation increases the delay time for the outsider and reduces the number of potential insiders possible in a particular area. Compartmentation also raises the number of insiders needed to accomplish successfully their goal, thus making detection of the insider easier. Compartmentation is an effective method of reducing the risks associated with the insider threat by limiting the number of personnel with access to production work areas. Independent, as well as "in-house," security analysis initiated Compartmentation, based on assessments of targets, insider vulnerability, and procedural noncompliance.

d. Subproject 04 - Central Shipping and Receiving Facility

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 5,865 [b]	$ 7,000	$0	$0	$0	$0	$0	3rd Qtr FY 1992-4th Qtr FY 1993

This subproject is complete. Key Decision 4 was issued December 1993.

e. Subproject 05 - Perimeter Lighting System

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$265 [b]	$730	$0	$0	$0	$0	$0	3rd Qtr. FY 1994-4th Qtr FY 1995

This subproject is complete. Key Decision 4 was issued January 1996.

f. Subproject 06 - Weapons Tactics and Training Facility

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 5,290 [b]	$ 5,500	$0	$0	$0	$0	$0	4th Qtr. FY 1996-4th Qtr. FY 1997

This subproject is complete. Key Decision 4 was issued March 1998.

g. Subproject 07 - Physical Training Facility

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 2,350 [b]	$ 2,500	$0	$0	$0	$0	$0	2nd Qtr. FY 1996-3rd Qtr. FY 1997

This subproject is complete. Key Decision 4 was issued August 1997.

[b] Current TEC reflects final subproject costs.

h. Subproject 08 - Alternate Command Posts

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 2,550 [b]	$ 3,100	$0	$0	$0	$0	$0	3rd Qtr. FY 1994-4th Qtr FY 1995

This subproject is complete. Key Decision 4 was issued October 1996.

i. Subproject 09 - Upgrade Staging Magazine Headwalls

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 86 [b]	$ 280	$0	$0	$0	$0	$0	3rd Qtr. FY 1992-4th Qtr. FY 1992

This subproject is complete. Key Decision 4 was issued September 1992.

j. Subproject 10 - Isolation Area Fence Enhancement

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 2,396 [b]	$ 1,750	$0	$0	$0	$0	$0	4th Qtr. FY 1994-1st Qtr. FY 1996

This subproject is complete. Key Decision 4 was issued June 1996.

[b] Current TEC reflects final subproject costs.

k. Subproject 11 - Protected Area Guard Towers

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 1,946 [b]	$ 1,600	$0	$0	$0	$0	$0	4th Qtr FY 1994-4th Qtr. FY 1995

This subproject is complete. Key Decision 4 was issued October 1996.

l. Subproject 12 - Security Command Center Expansion

TEC	Previous TEC from FY 1996 CPDS	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Construction Start-Completion Dates
$ 1,904 [c]	$ 1,370	$0	$0	$0	$0	$0	3rd Qtr FY 1994-4th Qtr. FY 2000

This subproject will consist of two activities, facility expansion and facility renovation to the Security Command Center, Building 12-75, Computer Room.

Facility Expansion is complete. Key Decision 4 was issued October 1996.

Renovation of the existing computer room will be performed at the completion of the Pantex/Argus system cut-over.

Project Milestones

FY 1999: Electronic Enhancements subprojects:

Aircraft Detection System (ADS): Design and Procurement

Perimeter Intrusion Detection & Assessment System (PIDAS): Complete system Cut-Over

Interior Security Alarm System (ISAS): Start System Cut-Over

Compartmentation: Start System Cut-Over.

Positive Personnel Identification and Verification (PPIV): Start-up of booths located at Station A, B, 20, 26, 28, 30, 88 and Gate MW-20.

[b] Current TEC reflects final subproject costs.

[c] Estimated cost at project completion.

FY 2000: Electronic Enhancements subprojects:

Interior Security Alarm System (ISAS): Complete System Cut-Over

Compartmentation: Complete System Cut-Over

Aircraft Detection System (ADS): Start-up

4. Details of Cost Estimate

SUBPROJECTS	ED&I	CONST.	STD EQUIP	CONTINGENCY	TEC
a. SNM Component Staging Facility	4,196	19,504	710	121	24,531
b. Protected Area Enhancement	898	1,936	0	0	2,834
c. Electronic Enhancements	15,295	65,388	0	500	81,183
d. Central Shipping & Receiving Facility	812	4,680	373	0	5,865
e. Perimeter Lighting System	86	179	0	0	265
f. Weapons Tactics & Training Facility	730	4,560	0	0	5,290
g. Physical Training Facility	253	2,097	0	0	2,350
h. Alternate Command Post	223	2,327	0	0	2,550
i. Upgrade Staging Magazine Headwalls	7	79	0	0	86
j. Isolation Area Fence Enhancement	203	2,193	0	0	2,396
k. Protected Area Guard Towers (4 towers)	179	1,767	0	0	1,946
l. Command Center Expansion	258	1,643	0	3	1,904
Total Project Cost	23,140	106,353	1,083	624	131,200

5. Method of Performance

The design services (Studies, Title I, Title II, and partial Title III) will be accomplished by outside A-E firms and will be administered by the Department of Energy or the Operating Contractor (Mason & Hanger-Silas Mason Co., Inc.).

The construction services of this project will be performed by outside construction contractors operating under fixed-price, lump-sum contracts to be awarded on the basis of competitive bids. These contracts will be administered by DOE, and/or the Operating Contractor. The construction contractors will perform all work in accordance with the construction documents.

All equipment not specified to be procured and/or installed by the construction contractors will be procured and/or installed by the operating contractor (Mason & Hanger-Silas Mason Co., Inc.).

Construction Management Services will be performed by the DOE, Operating Contractor, and/or by a construction management firm under contract to DOE or the Operating Contractor.

Final connections for new security alarms, fire alarms and specific communications equipment will be accomplished by the Operating Contractor.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Total project cost							
Total facility Cost							
Design	21,864	600	249	412	15	0	23,140
Construction	84,869	5,968	7,230	6,588	3,405	0	108,060
Total facility costs (Federal and Non-Federal)	106,733	6,568	7,479	7,000	3,420	0	131,200
Other project costs							
R&D necessary to complete construction	172	0	0	0	0	0	172
Conceptual design cost	233	0	0	0	0	0	233
NEPA documentation costs	15	0	0	0	0	0	15
Other project-related costs	4,580	3,520	2,000	1,500	380	0	11,980
Total other project costs	5,000	3,520	2,000	1,500	380	0	12,400
Total Project Cost (TPC)	111,733	10,088	9,479	8,500	3,800	0	143,600

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Related annual costs (estimated life of project–25 years)		
Facility operating costs	1,000	1,000
Programmatic operating expenses directly related to the facility	1,000	1,000
Total related annual funding (operating from FY 2000 through FY 2024)	2,000	2,000

Weapons Activities Program Direction

Mission Supporting Goals and Objectives

Program Direction provides funds for all Federal personnel-related expenses for Defense Programs offices at the Department of Energy (DOE) Headquarters and the Albuquerque, Nevada, Oak Ridge, Oakland, and Savannah River Operations Offices. At the Albuquerque and Nevada Operations Offices, Defense Programs also provides for technical and administrative Federal support for other DOE programs. Funding is provided for technical support throughout the Defense Programs complex in the areas of environment, safety, and health; safeguards and security; National Environmental Policy Act compliance; and compliance with Federal and state legislation, response to Defense Nuclear Facilities Safety Board recommendations, Departmental Executive Orders, and Departmental Strategic Alignment Initiatives (SAI).

Performance Measures

- Continue to meet or exceed reductions in Strategic Alignment Initiative Federal Staffing targets while providing program, policy, and operational oversight of the Stockpile Stewardship Program.
- Continue to implement the recommendations of the 120-Day Study.
- Undertake an independent assessment of the Stockpile Stewardship Program and its implementation throughout the DP national security enterprise.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque					
Salaries & Benefits	67,510[a]	85,650	88,641	2,991	3.5%
Travel	4,644	6,700	6,700	0	0 0%
Support Services	17,464	8,750	8,711	-39	-0.4%
Other Related Expenses	30,428	24,500	19,941	-4,559	-18.6%
Total, Albuquerque	120,046	125,600	123,993	-1,607	-1 3%
Full Time Equivalents[b]	1,109	1,151	1,122	-29	-2.5%

[a]Does not reflect use of $13,085,000 in prior year balances to mitigate effects of reduced appropriations, consistent with the FY 1998 Energy & Water Development Appropriations Conference Report (H.R. 105-271).

[b]This FTE level represents an employment ceiling Defense Programs anticipates an employment level below the ceiling.

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nevada					
Salaries & Benefits	19,406	19,155	19,678	523	2.7%
Travel	620	632	619	-13	-2.1%
Support Services	7,024	6,298	6,069	-229	-3.6%
Other Related Expense	8,173	8,110	7,908	-202	-2.5%
Total, Nevada	35,223	34,195	34,274	79	0.2%
Full Time Equivalents[a]	253	259	238	-21	-8.1%
Oakland					
Salaries & Benefits	6,658	6,257	6,822	565	9.0%
Travel	418	511	400	-111	-21.7%
Support Services	2,588	2,202	2,122	-80	-3.6%
Other Related Expenses	1,969	1,620	1,710	90	5.6%
Total, Oakland	11,633	10,590	11,054	464	4.4%
Full Time Equivalents[b]	80	82	84	2	2.4%
Oak Ridge					
Salaries & Benefits	5,099	5,085	4,950	-135	-2.7%
Travel	228	256	256	0	0.0%
Support Services	2,205	1,670	1,677	7	0.4%
Other Related Expenses	2,865	2,629	2,605	-24	-0.9%
Total, Oak Ridge	10,397	9,640	9,488	-152	-1.6%
Full Time Equivalents[c]	64	64	58	-6	-9.4%

[a]This FTE level represents an employment ceiling. Defense Programs anticipates an employment level below the ceiling.

[b]This FTE level represents an employment ceiling. Defense Programs anticipates an employment level below the ceiling.

[c]This FTE level represents an employment ceiling. Defense Programs anticipates an employment level below the ceiling.

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Savannah River					
Salaries & Benefits	2,748	2,820	2,933	113	4.0%
Travel	364	270	281	11	4.1%
Support Services	-223	107	183	76	71.0%
Other Related Expenses	67	135	140	5	3.7%
Total, Savannah River	2,956	3,332	3,537	205	6.2%
Full Time Equivalents[a]	32	33	33	0	0.0%
Headquarters					
Salaries & Benefits	31,958	29,600	28,900	-700	-2.4%
Travel	2,273	2,278	2,700	422	18.5%
Support Services	15,435	17,452	17,650	198	1.1%
Other Related Expenses	20,079	17,313	14,904	-2,409	-13.9%
Total, Headquarters	69,745	66,643	64,154	-2,489	-3.7%
Full Time Equivalents[b]	299	287	264	-23	-8.0%
Total Weapons Activities					
Salaries & Benefits	133,379	148,567	151,924	3,357	2.3%
Travel	8,547	10,647	10,956	309	2.9%
Support Services	44,493	36,479	36,412	-67	-0.2%
Other Related Expenses	63,581	54,307	47,208	-7,099	-13.1%
Subtotal, Program Direction	250,000	250,000	246,500	-3,500	-1.4%
Use of Prior Year Balances	-284[c]	-4,603[d]	0	4,603	-100.0%
Total, Program Direction	249,716	245,397	246,500	1,103	0.4%
Full Time Equivalents[e]	1,837	1,876	1,799	-77	-4.1%

[a]This FTE level represents an employment ceiling. Defense Programs anticipates an employment level below the ceiling.

[b]This FTE level represents an employment ceiling. Defense Programs anticipates an employment level below the ceiling.

[c]Reflects reduction of $284,000, the Weapons Activities Program Direction allocated share of the bottom line Weapons Activities appropriations reduction for the use of prior year balances.

[d]Reflects reduction of $4,603,000, the Weapons Activities Program Direction allocated share of the bottom line Weapons Activities appropriations reduction for the use of prior year balances.

[e]This FTE level represents the employment ceiling. Defense Programs anticipates a total employment level below the ceiling.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
In FY 1998 Defense Programs aggressively sought to reduce its staffing levels in order to come into line with the Department's Strategic Alignment Initiative staffing targets. As a result of these efforts, DP's actual staffing was reduced by about 160 during FY 1998, of which 88 were incentivized separations, 17 were involuntarily separated, and the remainder through normal departures and retirements. The estimated cost of these incentivized and involuntary separations in FY 1998 was about $4.7 million.	133,379[a]	143,627	146,948
In FY 1999, 18 staff were transferred from the Office of Environmental Management to DP to support the oversight of waste management activities at the Los Alamos and Sandia National Laboratories and the Pantex Plant.		1,440	1,476
Begin in FY 1999 5 Annual Payments to convert the TSD couriers to a 20 year retirement schedule		3,500	3,500
Total, Salaries and Benefits	133,379	148,567	151,924
Travel			
Travel includes funding for the transportation of Government employees, their per diem allowances while in authorized travel status, and other expenses incidental to travel. Travel also includes transportation of things; an example, the transportation of household goods related to a permanent change of station. A significant element of this category is the travel for the Transportation Safeguards Division (TSD) couriers which has been low through FY 1998.	8,547	10,647	10,956

[a]Does not reflect use of $13,085,000 in prior year balances to mitigate effects of reduced appropriations, consistent with the FY 1998 Energy & Water Development Appropriations Conference Report (H.R. 105-271).

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Support Services			
Technical support includes services to determine feasibility of design considerations, development of specifications, system definition, system review and reliability analyses, economic and environmental analyses, test and evaluation, surveys or reviews to improve the effectiveness, efficiency, and economy of technical operations.	23,257	17,487	16,255
Management Support services include analysis of workload and work flow, directives management studies, automatic data processing, manpower systems analyses, assistance in the preparation of programs plans, training and education, and any other reports or analyses directed toward improving the effectiveness, efficiency, and economy of management and general services.	21,236	18,992	20,157
Total, Support Services	44,493	36,479	36,412
Other Related Expenses			
Contractual support and other related expenses for the Albuquerque and Nevada Operations Offices where Defense Programs acts as the Department's landlord and is responsible for providing federal work space and maintenance support at these locations (decrease in FY 1999 from FY 1998 reflects transfer of LANL fire protection services contract to LANL from AL).	26,751	21,610	26,849
Defense Programs makes an annual $250,000 payment in lieu of taxes to the County of Los Alamos.	250	250	250
Support to the Los Alamos County School District and annual endowment payments to the Foundation to support educational enrichment activities in northern New Mexico [Funding responsibility for payments to the Los Alamos School District and the Foundation transferred to Weapons Stockpile Stewardship, Education in FY 2000].	11,100	10,000	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Provide support to northern New Mexico tribal governments to aid them in their ongoing efforts to protect Tribal rights and assist departmental decision-making relative to the Los Alamos National Laboratory [Funding responsibility for the Tribal agreements is proposed to be transferred to Weapons Stockpile Stewardship, Special Projects in FY 2001]	500	750	750
Contractual support and other related expenses for DP federal staff at Operations Offices where DP is not the landlord	4,901	4,384	4,455
Contractual support, other related expenses, and the Headquarters Working Capital Fund: During FY 1998, Defense Programs returned approximately 8,500 square feet of office space to the Department. Not only will this reduce DP's costs, it should reduce total Department costs as it will allow other organizations to vacate currently leased off-site space Also included in this category is DP's allocated share of ongoing Department activities that provide benefit to Defense Programs. In FY 1998 these activities included the National Science Bowl ($100,000); the Diversity Partnership Program ($60,000); the Research and Development In the United States (RaDIUS) database ($45,000); the Department's Strategic Plan ($205,000); the Visitor Assignment Management System ($50,000); the Quality Assurance Working Group ($150,000); the Safety Management Implementation Team ($165,000); the Condition Assessment System ($150,000); and the Environmental Liability Assessment ($30,000)	10,825	9,313	10,404
Provide to management and operating contractors research, development and technical assistance on compliance and improvement issues related to environment, safety, health, safeguards and security [Funding responsibility for ES&H and S&S technical support is proposed to be transferred to Weapons Stockpile Management in FY 2001].	9,254	8,000	4,500
Total, Other Related Expenses	63,581	54,307	47,208
Total, Program Direction	250,000	250,000	246,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs FY 2000 ($000)
Salaries & Benefits	
■ A small increase, about 2 percent, covers a portion of the annual cost of living pay raises and locality adjustments. The rest of the annual increases will be funded by allowing DP's workforce to decline in size through attrition.	3,357
Travel	
■ A small increase in federal travel is requested to support ongoing oversight of increasing contractor activities.	309
Support Services	
■ Funding is requested in FY 2000 to conduct a study of the management implementation of the Stockpile Stewardship Program, consistent with the Defense Programs Performance Plan	2,000
■ Funding increase to reflects the transfer of funding of an Amarillo Area Office support contract previously included within Weapons Stockpile Management.	2,600
■ Other Advisory & Assistance activities are reduced consistent with ongoing strategic alignment initiatives, representing a 13 percent decrease from the FY 1999 program level	-4,667
Total, Support Services	-67
Other Related Expenses	
■ Funding is increased by $7.0 million to reflect the transfer of funding for the Amarillo, Kansas City and Kirtland Area Offices (Albuquerque Operations Office). Previously, these offices were funded from within Weapons Stockpile Management, however, they have been transferred in FY 2000 in order to show the full cost of providing federal program and operational oversight. This increase is partially offset by other contractual support requirement reductions.	6,401
■ Transfer of funding responsibility for Community Assistance (Los Alamos School District and the foundation for educational enrichment in Northern New Mexico) to Weapons Stockpile Stewardship	-10,000
■ Reduce direct support for inter-contractor ES&H and S&S technical assistance	-3,500
Total, Other Related Expenses	-7,099
Total Funding Change, Program Direction	-3,500

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Feasibility of Design Considerations	2,639	997	950	-47	-4.7%
Economic and Environmental Analysis	10,131	8,465	7,933	-532	-6.3%
Test and Evaluation Studies	10,003	8,025	7,372	-653	-8.1%
Total, Technical Support Services	22,773	17,487	16,255	-1,232	-7.0%
Management Support Services					
Management Studies	1,715	3,254	4,581	1,327	40.8%
Training and Education	731	803	791	-12	-1.5%
ADP Support	11,610	9,975	9,835	-140	-1.4%
Administrative Support Services	7,664	4,960	4,950	-10	-0.2%
Total, Management Support Services	21,720	18,992	20,157	1,165	6.1%
Subtotal, Support Services	44,493	36,479	36,412	-67	-0.2%
Use of Prior Year Balances	0	0	0	0	0.0%
Total Support Services	44,493	36,479	36,412	-67	-0.2%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Other Related Expenses/Training	7,181	5,534	6,201	667	12.1%
Contractual Services					
Printing and Reproduction	449	434	410	-24	-5.5%
Rental Space/Facility Maintenance	3,359	3,510	3,569	59	1.7%
Software Procurement/Maintenance Activities/ Capital Acquisitions	4,254	4,140	4,034	-106	-2.6%
LANL Firefighter Support	8,409	0	0	0	0.0%
AL Area Office Support Transfer (Amarillo, Kansas City and Kirtland Area Offices, $2.6 million increase also included within Management Support Services)	0	0	7,000	7,000	100.0%
Other	14,653	17,493	16,244	-1,249	-7.1%
Total, Contractual Services	31,124	25,577	31,257	5,680	22.2%
Working Capital Fund	4,422	4,446	4,500	54	1.2%
Los Alamos Community Assistance (Schools and Foundation)	11,100	10,000	0	-10,000	0.0%
Northern New Mexico Pueblos	500	750	750	0	0.0%
ES&H, S&S Technical Support	9,254	8,000	4,500	-3,500	-43.8%
Subtotal, Other Related Expenses	63,581	54,307	47,208	-7,099	-13.1%
Use of Prior Year Balances	0	0	0	0	0.0%
Total, Other Related Expenses	63,581	54,307	47,208	-7,099	-13.1%

Other Defense
Activities

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(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Defense Environmental Restoration & Waste Management					
Site/project completion	964,909	1,039,787	980,919	-58,868	-5.7%
Post 2006 completion					
Environmental Restoration	2,751,706	2,714,509	2,933,548	219,039	8.1%
Health Studies (EH)	——	12,000	20,000	8,000	66.7%
Total, Post 2006 completion	2,751,706	2,726,509	2,953,548	227,039	8.3%
Science and technology	269,213	243,156	230,500	-12,656	-5.2%
Program direction	345,000	337,073	349,409	12,336	3.7%
Subtotal, Defense Environmental Restoration & Waste Management.	4,330,828	4,346,525	4,514,376	167,851	3.9%
Use of prior year balances and other adjustments	-11,253	-25,958	——	25,958	100.0%
Dupont pension refund (EH)	——	——	-8,700	-8,700	——
Total, Defense Environmental Restoration & Waste Management.	4,319,575	4,320,567	4,505,676	185,109	4.3%

Other Defense Activities

Proposed Appropriation Language

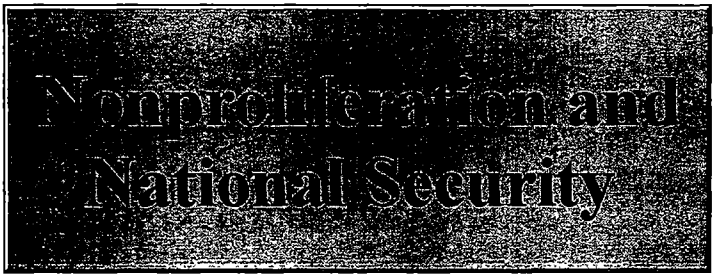
For Department of Energy expenses, including the purchase, construction and acquisition of plant and capital equipment and other expenses necessary for atomic energy defense, other defense activities, in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, [$1,696,676,000, to remain available until expended] *$1,792,000,000,* to remain available until expended: *Provided, That not to exceed $3,000 may be used for official reception and representation expenses for transparency activities and not to exceed $2,000 for the same purpose for national security and nonproliferation activities. Further, for the forgoing purposes, $1,792,000,000, to become available October 1, 2000 and remain available until expended, of which not to exceed $3,000 may be used for official reception and representation expenses for transparency activities and not to exceed $2,000 for the same purpose for national security and nonproliferation activities.* (Energy and Water Development Appropriations Act, 1999.)

[For an additional amount for "Other Defense Activities", for expenditures in the Russian Federation to implement a United States/Russian accord for the disposition of excess weapons plutonium, $200,000,000, to remain available until expended: Provided, That none of the funds may be obligated until the Department of Energy submits to Congress a detailed budget justification for use of these funds, and the proposal has been approved by the House and Senate Committees on Appropriations: Provided further, That the entire amount shall be available only to the extent an official budget request for a specific dollar amount that includes designation of the entire amount of the request as an emergency requirement as defined by the Balanced Budget and Emergency Deficit Control Act of 1985, as amended, is transmitted by the President to the Congress: Provided further, That the entire amount is designated by the Congress as an emergency requirement pursuant to section 251(b)(2)(A) of the Balanced Budget and Emergency Deficit Control Act of 1985, as amended.]

[For an additional amount to purchase natural uranium associated with the 1997 and 1998 deliveries under the United States-Russia HEU Purchase Agreement (hereinafter, "the Agreement"), $325,000,000, to remain available until expended, which shall be available only to the extent an official budget request for a specific dollar amount that includes designation of the entire amount of the request as an emergency requirement as defined in the Balanced Budget and Emergency Deficit Control Act of 1985, as amended, is transmitted to the Congress: Provided, That the entire amount is designated by the Congress as an emergency requirement pursuant to section 251(b)(2)(A) of the Balanced Budget and Emergency Deficit Control Act of 1985, as amended: Provided further, That such uranium is located in the United States at the time purchase, and shall become part of the inventory of the Department of Energy: Provided further, That such funds shall be available only upon conclusion of a long-term agreement by the Government of the Russian Federation and commercial partners for the sale of uranium to be derived from deliveries scheduled for 1999 and thereafter under the Agreement. (Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, Public Law 105-277, Division B, Title I, chapter 2.)

Explanation of Change

Changes in the appropriation language include the number of vehicles required; a request for appropriations covering two years; addition of language covering limits on official reception and representation expenses; and deletion of language pertaining to the one-time emergency appropriations for plutonium disposition and uranium disposition.


Nonproliferation and
National Security

Nonproliferation and National Security

Executive Budget Summary

Mission

The worldwide proliferation of Weapons of Mass Destruction (WMD) and their missile delivery systems has emerged as one of the most serious dangers confronting the United States. This problem is continuing and evolving, with far-reaching consequences for international security and stability.

The President has made nonproliferation one of the nation's highest National Security priorities. For FY 2000, he has proposed an expanded, multi-agency threat reduction initiative for the Russian WMD complex. At least 20 countries -- some of them hostile to the United States -- already have or may be developing WMD through the acquisition of dual-use technology, indigenous development and production, and/or support from rogue supplier states.

Based on the highly specialized scientific, technical, analytical, and operational capabilities of the Department and its National Laboratories, the Department of Energy (DOE), through its Office of Nonproliferation and National Security, is uniquely suited to provide leadership in national and international efforts to reduce the danger to U.S. National Security posed by WMD. The Office of Nonproliferation and National Security accomplishes this mission by: (1) **preventing** the spread of WMD materials, technology, and expertise; (2) **detecting** the proliferation of WMD worldwide; (3) **reversing** the proliferation of nuclear weapons capabilities; and (4) **responding** to WMD emergencies.

Strategy

In order to reduce the international proliferation threat, the Office of Nonproliferation and National Security is focusing its resources and expertise on the following near-term priorities: (1) securing nuclear materials, technology, and expertise in Russia and the Newly Independent States; (2) maintaining effective protection, control, and accountability of nuclear materials, technology, and expertise in the United States; (3) limiting weapons-usable fissile materials worldwide; (4) developing new technologies against emerging chemical and biological threats; (5) developing and integrating a program for preventing, detecting and responding to nuclear terrorism and smuggling; (6) enabling transparent and irreversible nuclear reductions; (7) supporting the implementation of a Comprehensive Test Ban Treaty (CTBT); (8) controlling nuclear exports; (9) strengthening the nuclear nonproliferation regime; and (10) reducing the threat posed by the operation of unsafe nuclear facilities worldwide.

Some of our most important international activities include: conducting the government-to-government and laboratory-to-laboratory programs of cooperation between U.S. nuclear experts and their counterparts at nuclear facilities and institutes in the former Soviet Union to improve materials protection, control and accountability; assisting Russia and the Newly Independent States in establishing and enhancing nuclear material export control systems; developing technologies and systems to detect the proliferation of WMD and to monitor and verify existing treaties; working with the Democratic

Peoples Republic of Korea (DPRK) to maintain the integrity of long-term storage of the spent fuel canisters at Nyongbyon nuclear site prior to their removal from North Korea; working with the private sector to engage WMD weapons scientists, engineers, and technicians in the former Soviet Nuclear Cities in activities which reduce the proliferation threat and promote their transition to non-defense sector employment; and providing technical support for long-term monitoring of Iraqi facilities and other nuclear safeguards and emergency programs of the International Atomic Energy Agency (IAEA). In addition, we are providing unique and in-depth technical, policy, and research expertise as part of the U.S. Government's integrated efforts to implement a CTBT. We also provide emergency management experts to assist other foreign governments in reviews of their emergency preparedness plans and capabilities.

In concert with our international activities, we are responsible for wide-ranging activities to accomplish nonproliferation and national security goals in the United States. These activities include: directing a rigorous safeguards and security program for the entire Department of Energy complex, thereby ensuring the security of our own nuclear materials, technology and expertise; declassifying millions of DOE documents while protecting critical information that has the potential to facilitate the proliferation of weapons of mass destruction; managing and improving the Department's emergency management and response capability and providing assistance to other government agencies as well as state, tribal, and local governments; and maintaining a security investigations and reinvestigations program for both Federal and contractor employees of the Department. DOE also provides technical, analytical, policy and implementation support to the efforts of the nation's policy community to deal with nonproliferation issues.

In FY 2000, the Department will achieve its nonproliferation and national security priorities by: (1) providing materials protection, control and accountability for fissile materials in Russia and the Newly Independent States; (2) working to complete installation of MPC&A upgrades on all Russian Naval fresh fuels by December 2000; (3) cooperating with authorities in the former Soviet Union to redirect scientific intellectual capital through the science and technology centers and the Initiatives for Proliferation Prevention Program; (4) promoting the transition of nuclear weapons workers to non-defense work through the Russian Nuclear Cities Initiative; (5) shipping stabilized fuel canisters from the Aktau site in Kazakhstan and putting them in underground storage silos for long-term storage; (6) enhancing efforts to detect and stem the proliferation of chemical and biological weapons and to respond to potential terrorist use of such weapons; (7) concentrating efforts toward limiting the production and use of weapons-usable fissile materials in the civil sector by reducing and eventually eliminating the use of highly enriched uranium and promoting alternatives to the civil use of plutonium, continuation of the Reduced Enrichment for Research and Test Reactors (RERTR) Program, and by purchasing, where appropriate, at-risk weapons-usable nuclear materials; (8) providing necessary research, technology development, analysis, and training as part of the U.S. Government's efforts to complete and implement a CTBT; (9) developing and implementing an integrated approach to nuclear smuggling, terrorism, and emergency response; (10) enabling transparency and irreversibility in the nuclear weapon dismantlement process; (11) strengthening the international nonproliferation regime through measures which include our efforts in North Korea, negotiation of an international fissile

material cutoff convention and cooperation with and support for the IAEA safeguards programs, including the facilitation of IAEA inspections in the United States.

During FY 2000, DOE will support the President's initiative on Keeping America Secure for the 21st Century by increasing funding to accelerate the development and fielding of key technologies to improve the U.S. capability to prepare for and respond to domestic terrorism involving chemical and biological agents. In addition, we will initiate design of the Nonproliferation and International Security Center at Los Alamos National Laboratory, Los Alamos, New Mexico.

The Department will sustain support to the domestic safeguards and security of nuclear weapons, nuclear materials, classified information and facilities against theft, sabotage, espionage, and terrorist activities. A major emphasis will be support to the Declassification program and implementation of Section 3161 of the National Defense Authorization Act for FY 1999. In addition, DOE will support a Critical Infrastructure Program to help insure protection of certain critical national infrastructures against both physical and cyber attacks. It will also maintain an emergency management program for response to domestic hazards and to provide assistance internationally.

Beginning in FY 2000, NN will budget for the International Nuclear Safety Program. The Program supports international nuclear safety cooperation, and addresses safety issues associated with nuclear materials facilities in Russia. In addition NN will budget for the Highly Enriched Uranium Transparency Implementation program that is responsible for insuring that the nonproliferation aspects of an agreement between the United States and the Russian Federation are met.

Finally, in support of all of the Department's nonproliferation capabilities, we will continue to develop technologies and systems for detecting, characterizing, and monitoring proliferant activities worldwide.

January 26, 1999
Date

Rose Gottemoeller
Director
Office of Nonproliferation
and National Security

FY 2000 Congressional Budget Request

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Research and Development	204,859	210,000	221,000
Arms Control	234,600	256,900	296,000
Intelligence	33,600	41,600	0
International Nuclear Safety	70,000	30,000[1]	34,000[a]
HEU Transparency Implementation	0	0	15,750
Nuclear Safeguards and Security	47,200	55,200	59,100
Security Investigations	30,000	30,000	30,000
Emergency Management	20,000	21,000	21,000
Program Direction	82,900	86,900	90,450
Subtotal, Nonproliferation and National Security	723,159	731,600	767,300
Use of Prior Year Balances	-1,163	-6,176	0
Offset by Programs	0	-20,000	-20,000
Total, Nonproliferation	721,996[2]	705,424	747,300
Full Time Equivalents	398	408	374

[1]Program Offices are providing funding for Security Investigations to be used for all contractor personnel in the field. For FY 1999 $20 million appropriated plus $15 million may be allocated through Congressional Notification letter, and for FY 2000 a request of $20 million.

[2]Includes $35.0 million from AID.

Nonproliferation and Verification Research and Development

Program Mission

The Department of Energy (DOE) Nonproliferation and Verification Research and Development (R&D) Program is devoted to conducting applied research, development, testing, and evaluation of science and technology for strengthening the U.S. response to National Security threats and threats to world peace posed by the proliferation of nuclear, chemical, and biological weapons and special nuclear material diversion. Activities are focused on the development, design, prototype construction and production of operational sensor systems needed for proliferation detection, proliferation prevention, treaty monitoring, and support to related intelligence activities.

The DOE will continue to leverage its considerable nuclear nonproliferation R&D base to address important objectives including: nuclear warhead dismantlement initiatives; countering nuclear smuggling and terrorism; applying DOE's resident chemical and biological science expertise to support U.S. preparation for and response to the use of chemical and biological agents; and supporting Law Enforcement agencies. All activities also support the timely transfer of tested prototype systems to other U.S. Government agency users. The program also supports commercialization of technologies and contributes to the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs.

Program Goal

The program goal is to enhance U.S. National Security through needs-driven research and development, with emphasis on developing the requisite fundamental science and technology to detect and prevent nuclear proliferation, meet U.S. treaty monitoring goals, and assist in equipping domestic agencies to mitigate against potential threats to the U.S. from chemical and biological agents.

Program Objectives

- Develop and demonstrate technologies needed to remotely detect the early stages of a proliferant nation's nuclear weapons program.
- Develop and demonstrate technologies to locate, identify, and characterize nuclear explosions underground, underwater, in the atmosphere, and in space. Delivery of these R&D products will enhance the Comprehensive Test Ban Treaty (CTBT) ratification process.
- Produce operational satellite-based nuclear test monitoring sensor systems.
- Develop and demonstrate detection technologies for nuclear materials protection, control, and accounting; nuclear warhead dismantlement monitoring; and intelligence support.

- Develop and demonstrate technologies to detect and deter the diversion and smuggling of nuclear weapons and special nuclear material, and to support Law Enforcement forensics.
- Transition developed technologies to other agencies; for example, the Military (counter proliferation) and Law Enforcement (counter narcotics).
- Develop and test, in partnership with the Department of Defense (DoD) and other agencies, capabilities that dramatically improve our ability to detect the proliferation of chemical and biological agents at an early stage, and to minimize the consequences of potential use of chemical or biological agents.

Performance Measures

Proliferation Detection

- Complete laboratory testing of lidar science base/prototype instrument for detection and classifying chemical effluents related to proliferation activities. Ready for integration into an aircraft.
- Following launch of the Multispectral Thermal Imager (MTI) small satellite in FY 2000, the sensor will be operated on-orbit- to provide data for scientific analysis by DOE and other agencies to demonstrate thermal imaging technology for nonproliferation treaty monitoring and other National Security and civil applications.
- Complete field testing of a passive spectral imaging system for remote detection and characterization of chemical effluents related to proliferation activities.

Treaty Monitoring

- Deliver the hardware, software and analytical capability to the U.S. National Data Center to evaluate CTBT data and to make verification assessments.
- Deliver three operational nuclear treaty monitoring sensor systems per year to the U.S. Air Force (USAF) Global Positioning System (GPS) spacecraft integrating contractor.

Deterrence and Detection Technologies

- Develop analytical methods to enhance U.S. laboratory equipment for monitoring nuclear proliferation and for supporting forensic investigations of intercepted nuclear materials by domestic or international Law Enforcement agencies.
- Achieve major technical advances in the areas of chemical and biological detection, analysis, transport modeling, and decontamination; define and evaluate system concepts for two demonstration projects that integrate current capabilities in these technical areas.
- Develop detection technology for U.S. Law Enforcement and Intelligence agencies to provide new capabilities to respond to incidents and threats involving weapons of mass destruction. Technology will provide a rapid, sensitive and specific detection capability for domestic first responders or unattended applications.

Significant Accomplishments and Program Shifts

Proliferation Detection

- Field testing of a passive spectral imaging system for remote detection and characterization of chemical effluents related to proliferation activities will be completed. The program will conduct experimentation and modeling to extend passive special imaging capability beyond test libraries to best estimates of levels expected for actual nuclear proliferation signatures.
- Complete construction of the MTI small research satellite that will demonstrate and evaluate space-based multispectral and thermal imaging technology for nonproliferation treaty monitoring and other National Security and civilian applications.
- Hyperspectral algorithms will be developed and demonstrated to identify ecological regions that may have been affected by effluents from proliferation activities and potential causes of the ecological changes will be identified.
- Develop Interferometric Synthetic Aperture Radar (IFSAR) terrain mapping algorithms for treaty monitoring purposes, and provide the DoD with algorithms for their use in battle damage assessment and terrain elevation determination.

Treaty Monitoring

- Provide uninterrupted capability for continuous worldwide monitoring for atmospheric nuclear explosions, with sensors designed, developed, and produced by the program and deployed on the Air Force GPS satellite constellation. Research focus will continue to shift from the cold war Nuclear Explosion Detection (NUDET) mission to the emerging nuclear test threats from threshold states. Working closely with the U.S. Air Force, a replenishment plan will be implemented to ensure future GPS payloads address new threats.
- Work accomplished by the U.S. CTBT research and development program to detect underground, underwater, atmospheric, and space nuclear detonations will result in the delivery of integrated analysis software products to the U.S. National Data Center as well as providing support for commercialization of previously provided radionuclide and infrasound prototype detection systems. Research focus will shift toward calibration of globally distributed monitoring stations and associated monitoring equipment and data analysis tools.
- Following successful launch aboard an Air Force Pegasus-XL launch vehicle, the Fast On-orbit Recording of Transient Events (FORTE) small satellite is demonstrating advanced radio frequency technologies for monitoring the CTBT. FORTE is also providing scientists information on lightning and the structure of the ionosphere for possible use in weather forecasting and understanding the relationship of the ionosphere to environmental phenomena affecting the Earth.
- Reduce funding to the CTBT program will be used as an offset to the growing priorities of the Chemical and Biological Nonproliferation program and the new construction of the Nonproliferation and International Security Center at LANL.

Deterrence and Detection Technologies

- Analytical methods to enhance U.S. laboratory equipment capabilities to monitor nuclear proliferation and to support forensic investigations of intercepted nuclear materials by domestic and international Law Enforcement agencies will be developed.
- Undertake a comprehensive research and development program for detection and analytical technologies which integrate arms control, counter proliferation and counter terrorism objectives in order to prevent nuclear smuggling and terrorism using weapons of mass destruction (WMD).
- Within the chemical and biological nonproliferation research program, major advances have occurred in the development of new detection and forensic analysis technologies. In the detection area major technical successes have occurred that will enable the power of conventional laboratory instrumentation to be put into a hand-held device. In the biological forensics area, new techniques for strain analysis of high-priority threat pathogens are a key step in the detection of engineered organisms, and the identification of the geographical origin of biological agents samples to aid in the identification of proliferants.
- Increase funding for the Chemical and Biological Nonproliferation program due to the increased threat of terrorist use of chemical and biological weapons. Deterrence and Detection Technologies activities have been refocused to accommodate the priorities of the growing chemical and biological weapon threat as well as the new construction of the NISC at LANL.

Nonproliferation and International Security Center

- The Nonproliferation and International Security Center (NISC) will house approximately 465 people in a 164,000 square foot area at the Los Alamos National Laboratory. The facility will house laboratories for physics, electronics, and instrumentation development along with technical work spaces and administrative functions. The NISC will also include areas for program management, safeguard assessments, and intelligence activities.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriations	FY 2000 Request
Nonproliferation and Verification R&D					
Proliferation Detection	64,789	67,416	0	67,416	67,500
Treaty Monitoring	78,034	77,499	0	77,499	73,500
Deterrence and Detection Technologies	62,036	65,085	0	65,085	74,000
Subtotal, Nonproliferation and Verification R&D	204,859	210,000	0	210,000	215,000
Construction	0	0	0	0	6,000
Total, Nonproliferation and Verification R&D	204,859	210,000	0	210,000	221,000

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	2,108	3,363	3,363	0	0.0%
Kansas City Plant	210	0	0	0	0.0%
Los Alamos National Laboratory	60,180	57,418	64,964	+7,546	+13.1%
Sandia National Laboratory	68,235	69,902	71,747	+1,845	+2.6%
Total, Albuquerque Operations Office	130,733	130,683	140,074	+9,391	+7.2%
Chicago Operations Office					
Ames Laboratory	252	570	570	0	0.0%
Argonne National Laboratory	2,036	1,975	1,975	0	0.0%
Brookhaven National Laboratory	1,246	980	980	0	0.0%
Environmental Measurements Laboratory	408	385	385	0	0.0%
Total, Chicago Operations Office	3,942	3,910	3,910	0	0.0%
Idaho Operations Office					
Idaho National Eng. & Env. Laboratory	2,846	2,185	2,185	0	0.0%
Nevada Operations Office					
Nevada Operations Office	680	465	465	0	0.0%
Bechtel Nevada	3,375	2,515	2,515	0	0.0%
Total, Nevada Operations Office	4,055	2,980	2,980	0	0.0%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	1,272	1,110	1,110	0	0.0$
Lawrence Livermore National Laboratory	36,293	38,548	40,393	+1,845	+4.8%
Total, Oakland Operations Office	37,565	39,658	41,503	+1,845	+4.7%
Oak Ridge Operations Office					
Oak Ridge Y-12 Plant	5,760	6,479	6,479	0	0.0%
Richland Operations Office					
Pacific Northwest Laboratory	15,839	16,651	16,651	0	0.0%
Savannah River Operations Office					
Savannah River Technology Center	2,079	2,445	2,445	0	0.0%
Washington Headquarters	2,040	5,009	4,773	-236	-4.7%
Total, Nonproliferation & Verification Research & Development	204,859	210,000	221,000	+11,000	+5.2%

Albuquerque Operations Office

The Albuquerque Operations Office will provide administrative support for financial assistance awards to selected recipients who have submitted unsolicited proposals relevant to CTBT research and development activities. The Albuquerque Operations Office also oversees work at the Directed Energy Directorate of the Air Force Research Laboratory, located at the Kirkland Air Force Base in New Mexico. The Directed Energy Directorate will instrument the ARGUS RC-135 research aircraft which will be used to conduct remote chemical detection experiments using DOE sensors. The Directed Energy Directorate will integrate DOE prototype equipment on the aircraft and conduct field test over sites in the U.S.

Ames Laboratory

Ames Laboratory will develop standard methods for state-of-the-art commercial systems to enable U.S. forensics laboratories to attribute future terrorism associated with WMD. These research results will be transferred to local U.S. Law Enforcement agencies to improve investigations and for mitigation of the consequences of nuclear material release during foreign testing, terrorism or accidents.

Argonne National Laboratory

Argonne National Laboratory will conduct research on deployable arms control technology which can be used to analyze signatures from the production or reprocessing of nuclear weapon material, participate as a member of the Radiation Detection Panel, provide technical advisor services on nuclear systems for treaty monitoring, and develop nuclear material measurement techniques which can be used during investigations and for mitigation of the consequences of nuclear material release during foreign testing, terrorism or accidents.

Brookhaven National Laboratory

Brookhaven National Laboratory will develop stand-off detection and analysis technologies for arms control, nonproliferation and counter terrorism applications.

Environmental Measurements Laboratory

The Environmental Measurements Laboratory (EML) will provide advisory and quality assurance services to the radionuclide subsystem being installed internationally for the CTBT. EML is the leading candidate to replace the McClellan AFB radionuclide laboratory specified in the treaty when McClellan AFB is closed.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) will participate as a member of the Radiation Detection Panel and will develop detection technologies for arms control applications using accelerator systems. INEEL is a member of an interlaboratory group to develop technologies to counter terrorism and search/locate Highly Enriched Uranium. Additionally, INEEL will develop modeling capabilities for the design and test of specific advanced materials.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory will be a participant in the interlaboratory effort to develop a room temperature high resolution gamma spectrometer based on cadmium zinc telluride (CZT) materials.

Lawrence Livemore National Laboratory

Lawrence Livermore National Laboratory (LLNL) will develop specific geographical regional models to improve U.S. technical capability and confidence to locate and identify seismic events to support CTBT verification assessments, gamma ray imaging technology for arms control applications, advanced technologies to search and locate special nuclear material used in a threatening manner, analytical methods to use the investment of "smart highway systems" to detect WMD during crisis situations and consequence management, and forensics methods for law enforcement which will improve the U.S. capability to investigate the threat of WMD. LLNL will conduct research in the areas of active (lidar) and passive hyperspectral remote chemical detection, including hardware and software (algorithm) development and field testing systems onboard aircraft. LLNL personnel will provide planning for experiments conducted at the chemical gas release facility at the Nevada Test Site which is used to test all remote chemical detection sensors. LLNL will have a key role in the development of CBW transport modeling capabilities for prediction in urban areas and supports our development of DNA diagnostics for forensic analysis.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) will provide the U.S. National Data Center with improved analytic tools and sensors for discriminating small earthquakes and industrial activities from clandestine nuclear explosions. LANL will continue to develop the next generation electromagnetic pulse sensor and radiation sensor systems for satellite-based systems. The laboratory will investigate remote unattended methods to monitor SNM in long-term storage for arms control and domestic safeguards, including unmanned systems which can strengthen internal safeguards by monitoring fissile materials in support of future arms control negotiations (e.g. START III) and other international safeguards initiatives. LANL will provide analysis of neural network applications to supply low cost and simple detection technology for treaty monitoring, regional and bilateral conflict resolution and advanced concepts for counter terrorism response. LANL will continue developing innovative algorithms and specialized processors to process voluminous quantities of remote sensing data into the specific information required by decision makers. LANL will continue developing a CO2 laser system and performing modeling and calibration for the MTI satellite sensors for surface temperature measurements. LANL is central to development of DNA diagnostics for forensic analysis, and in development of a biological detection system capable of biological agent strain differentiation.

Nevada Operations Office

The Nevada Operations Office will support experimental field tests at the HAZMAT Spill Center, a facility managed by the Nevada Operations Office and located at the Nevada Test Site. The HAZMAT Spill Center will be used because it is a unique, one-of-a-kind facility, built to conduct testing using hazardous materials under controlled conditions. The Nevada Operations Office will be the contracting office for grants to universities that participate in various detection and analysis research projects in partnership with the DOE National Laboratories.

Oak Ridge Y-12 Plant

The Oak Ridge Y-12 Plant will support the development of sampling technology and measurement protocols to improve the application of non-nuclear monitoring technology to detect and track nuclear materials production. To support this nonproliferation mission, Y-12 collaborates with Oak Ridge National Laboratory (ORNL) to develop concepts and prototype advanced monitoring tools for analytical systems to be used by DoD special operations and U.S. domestic Law Enforcement. ORNL will conduct research to support cooperative monitoring requirements for bilateral nonproliferation and arms control initiatives with Russia. ORNL will provide leading-edge research into candidate materials which could replace exiting nuclear detectors used for gamma spectroscopy and neutron detection. ORNL will continue investigation of small portable mass spectroscopy units and the application of micro-fluidics systems for "lab-on-a-chip" concepts. ORNL will continue development of an advanced mass spectrometer for real-time detection and identification of biological pathogens.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) will continue the development of laboratory methods and hand-held detection technologies in support of strategic arms control and National Security applications. The laboratory will support efforts to detect and characterize signatures from nuclear test monitoring systems. The laboratory will be a strong participant in the development of advanced forensics methods that are necessary to address WMD contaminated evidence analysis by Law Enforcement. PNNL will provide collaborative statistical support to other DOE National Laboratories conducting research and development for the CTBT program. Areas of research include discrimination algorithms to support geographical regional models; and overall statistical assessments to increase confidence in the CTBT monitoring system. PNNL will continue developing a heterodyne technique to increase the detection sensitivity of laser chemical-detection systems and algorithms for processing hyperspectral, ultraspectral and laser data for chemical detection, identification, and quantification.

Remote Sensing Laboratory

The Remote Sensing Laboratory will lead a consortium of universities to develop research tools which will enhance the capability of multispectral and hyperspectral sensors and data processing to detect proliferation activities.

Sandia National Laboratories

The Sandia National Laboratories (SNL) will develop, demonstrate, and validate improvements to existing and planned information system technologies to provide capabilities for highly automated, high confidence data processing and analysis in support of nuclear explosion monitoring. SNL will support the U.S. program to detect nuclear detonations from satellites by providing systems engineering, the optical sensors and the on-orbit processing and power conditioning technologies. In partnership with U.S. Law Enforcement, the laboratory will develop nuclear detection systems to interdict smuggled nuclear materials in transit across U.S. borders. SNL will participate in a multilaboratory effort to develop CZT as a room temperature spectrometer and in a consortium of national labs and academic institutions to develop micro-technologies for detection and analysis of chemicals. SNL will continue development of advanced Synthetic Aperture Radars and analysis methods for mapping, and the detection of proliferation events. SNL will continue development of an ultraviolet lidar system for remote detection of chemicals. SNL will continue managing, integrating, assisting in launch, and operation of the MTI satellite for measurements of surface temperatures. SNL will continue developing a "chemistry laboratory on a chip," a technology that will bring the power of an analytical laboratory down to a hand-held format. In addition, SNL will continue development of environmentally friendly CBW decontaminations foams.

Savannah River Technology Center

The Savannah River Technology Center (SRTC) will provide ground-based monitoring systems to analyze data collected by the MTI satellite in order to validate atmospheric and facility models based on ground-truth information. SRTC will support development of methods to exploit environmental sampling and provide advisory services for testing of new concepts to detect undeclared nuclear reprocessing.

Washington Headquarters

The DOE Headquarters transfers funding as required to the SBIR and STTR programs. In addition, DOE Headquarters manages funding transfers to other government agencies such as the Departments of the Navy, Air Force, and the Health and Human Services to provide their expertise to the Nonproliferation and Verification R&D Program.

Proliferation Detection

Mission Supporting Goals and Objectives

Develop and demonstrate innovative proliferation detection technologies including active (lidar-based) and passive hyperspectral electro-optical remote chemical effluent detection, space-based multispectral and thermal imagery, and advanced data analysis.

The multilaboratory and joint interagency projects within this activity area are comprised of comprehensive, end-to-end research and development efforts that (1) examine the nature of proliferation targets to determine remotely observable signatures, (2) conduct phenomena modeling to understand the environment's effects on observables and how these effects can be taken into account, (3) develop sensor systems to remotely detect and measure the observable, and (4) develop techniques to interpret the data and produce meaningful information.

These activities are closely coordinated with other Government agencies and, beginning FY 1999 and continuing in FY 2000, the methodology and experience that have resulted in significant advances in the nuclear proliferation detection mission area, are applied to the chemical and biological weapons proliferation arena. Many of the sensor systems and base technology designed to detect chemical signatures from nuclear weapons activities can be used to detect chemical signatures from chemical and potentially biological weapons activities.

Research to apply lidar for remote chemical detection will continue with ground and aircraft-based field tests of prototype detection systems to evaluate performance and to investigate concepts to extend designs to operate beyond their current limitations. Experimentation will continue to enhance analytical performance to distinguish nuclear proliferation signatures from background noise and to define the performance envelope of remote chemical detection systems developed by DOE as well as other agencies. Development of a short-range chemical effluent detection lidar system for use onboard an unmanned aerial vehicle (UAV) will accelerate, with plans to complete and test the system in FY 2001.

Following launch of the MTI small satellite in early FY 2000, operational testing and data collection will begin. MTI satellite data will demonstrate and evaluate multispectral and thermal imaging technologies for the passive, noncooperative detection and characterization of nuclear proliferant activities. Coordination with arms control, military, and other users of MTI data to refine test plans and operation concepts will continue.

In the area of hyperspectral remote chemical detection technology, field testing and development of exploitation techniques of an airborne, high spectral resolution imaging spectroradiometer for passive detection of nuclear proliferation chemical effluents will continue. This is part of an interagency effort to develop this technology. Particular emphasis will be given to developing computer tools to assist an analyst in extracting key information from the voluminous data supplied by the sensor. Chemical

effluent signature analysis research conducted for lidar development activities will be applied to passive imaging detection problems.

In FY 2000, activities will shift to begin to leverage the best capabilities of lidar and passive spectral sensing technologies into an integrated system. Based on extensive ongoing research and testing, the limitations of each technology may be compensated by the unique capabilities of the other, thereby producing a significant breakthrough and a national capability to collect chemical effluent information from great distances.

Synthetic aperture radar (SAR) algorithm development will be continued. This effort produces new methods of exploiting existing SAR systems to detect underground nuclear testing, and has resulted in many spin-off applications to other Government agencies.

The proliferation detection area is developing "onboard intelligence" methods that enable sensors to transmit "information" vice raw data back to the user. As a result, sensors can act more autonomously and will require less time and resources to provide the desired information to the end user.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Proliferation Detection	64,789	67,416	67,500	+84	0%
Total, Proliferation Detection	64,789	67,416	67,500	+84	0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Proliferation Detection			
■ Provide innovative and unconventional algorithms in order to reduce, in real time, voluminous quantities of remote sensing (radar, passive/active optical and radio-frequency) data into the specific information required by decision makers	8,309	8,583	9,263

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Important technical issues will be resolved through laboratory and field testing of next generation systems. These issues have major impacts on implementing lidar or a hybrid lidar into a fully operational system. Several laboratories are tasked to work cooperatively because this technical area is very challenging. An intermediate UAV based prototype will provide immediate limited utility to users, as well as identify technical challenges that require further development	24,160	26,266	27,070
■ The MTI small satellite will demonstrate absolute temperature measurement from space for the passive, noncooperative detection and characterization of proliferant activities. Satellite sensor data will become available in FY 2000 and will be analyzed by numerous organizations throughout the Government and academia	23,080	17,324	13,100
■ Continued emphasis will be placed on hyperspectral imaging technology. This area will work extensively with data taken by an airborne system and will develop new analysis techniques that will fully utilize the information available in a spectral image. Key enabling technologies will be identified and pursued	9,240	15,243	14,643
■ The evaluation of a remote chemical sensor system that leverages the capabilities of both passive hyperspectral and active lidar technology will be initiated to demonstrate, on a limited basis, all operational characteristics of a future world-wide proliferation monitoring sensor system	0	0	3,424
Total, Proliferation Detection	64,789	67,416	67,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Proliferation Detection	
■ Increase in lidar activities due to laser and component purchases for a UAV system	+804
■ Increase in synthetic aperture radar activities	+837
■ Decrease due to completion of MTI satellite construction costs in FY 1999 with only satellite launch and operations in FY 2000	-4,224
■ Small decrease in hyperspectral work as focus shifts to integrated lidar/hyperspectral system development	-600
■ Activities shift to exploit capabilities of hyperspectral and lidar remote chemical detection techniques in a common system architecture	+3,267
Total Funding Change, Proliferation Detection	+84

Treaty Monitoring

Mission Supporting Goals and Objectives

Develop and demonstrate technologies for monitoring international treaties banning the explosive testing of nuclear devices. Develop and field sensors and algorithms, which will, in a timely manner detect, locate, identify, and characterize nuclear explosions which occur in the atmosphere, in space, underground, and underwater. Address requirements for both international and independent U.S. national monitoring.

The Treaty Monitoring program is one of the DOE's longest standing nonproliferation initiatives. The concept of a U.S. national capability using satellite-borne nuclear explosion surveillance came about during interagency discussions from 1959 to 1962, leading to deployment of the original satellite explosion detection sensors. During the 39 years of this program, more than 100 DOE satellite payloads have been launched, using U.S. Air Force and National Aeronautics and Space Administration boosters. The national need for worldwide cognizance of nuclear explosions is as important as ever in this time of high nuclear proliferation concern.

National responsibility for executing CTBT R&D was consolidated within this DOE program in 1993. The R&D goal is to develop and demonstrate technologies for monitoring existing test ban treaties and the CTBT. Building on the delivery of radionuclide and infrasound prototypes to the U.S. National Data Center for commercialization, the DOE program is shifting toward calibration for the seismic, radionuclide, hydroacoustic and infrasound stations which enable treaty monitoring. This research and development program addresses both international and U.S. national monitoring requirements of a CTBT. Detection technologies are developed to detect nuclear explosions underground, underwater, in the atmosphere, and in space.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Treaty Monitoring	78,034	77,499	73,500	-3,999	-5.2%
Total, Treaty Monitoring	78,034	77,499	73,500	-3,999	-5.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Treaty Monitoring			
■ Produce, deliver, and operationally support three (3) Global Positioning System (GPS) satellite nuclear explosion detection flight systems per year, to maintain continuous, worldwide, monitoring capability as on-orbit GPS satellites age and are replaced. Develop and demonstrate the next generation of satellite-based optical, electromagnetic pulse, and radiation sensor systems to detect nuclear explosions in Earth's atmosphere and in space	48,995	49,940	48,920
■ Characterize explosion-like signals from natural and industrial sources to increase the reliability of analysis to distinguish natural events and industrial activity from nuclear weapons testing. Transfer enhanced regional data evaluation and explosion identification capabilities including calibration data, when possible, to the CTBT U.S. National Data Center (NDC). Provide NDC with operational support for its seismic, radionuclide, hydroacoustic, and infrasound sensor systems to enable the NDC to perform its nuclear treaty monitoring mission and to make verification assessments	29,039	27,559	24,580
Total, Treaty Monitoring	78,034	77,499	73,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Treaty Monitoring	
■ Delivery of the second installment of the operational and seismic part of the U.S. National Data Center's Knowledge Base moves to FY 2001 from FY 2000. This funding decrease will be used as an offset to the growing priorities of the Chemical and Biological Nonproliferation program and the new construction of the Nonproliferation and International Security Center at LANL	-3,999
Total Funding Change, Treaty Monitoring	-3,999

Deterrence and Detection Technologies

Mission Supporting Goals and Objectives

Our goals in this area are: (1) the development of enabling technologies to inhibit nuclear materials diversion in nonproliferation, arms reduction and counter terrorism applications, and (2) the development of advanced technologies to dramatically improve early detection capabilities, and preparation and response capabilities in general, to address the terrorist use of chemical or biological agents.

The technology development activities supported under this area are broadly aimed at deterring the terrorist of use of WMD. The initiatives in the nuclear areas focus on the development of technology to safeguard nuclear materials, to provide intelligence and warning of illicit nuclear materials, on detection of the transit of nuclear material, and on the materials analysis required to support Law Enforcement. In FY 2000, the nuclear R&D activities will focus on the development of technologies to counter nuclear smuggling and terrorism threats. Developed systems will enhance the U.S. capability to: conduct wide area searches; remotely monitor the storage of nuclear material placed under IAEA safeguards or under bilateral agreements with Russia; develop collection and analysis tools to detect proliferation activities associated with WMD production and military operations; and develop a new generation of cost-effective detection systems based on micro technologies. A closer partnership with U.S. Law Enforcement agencies will be constructed during FY 2000 to share field and laboratory systems. Ongoing research on technologies which can be exploited by the intelligence and Law Enforcement agencies will be accelerated.

The goal of the chemical and biological nonproliferation research and development program is to reduce the U.S. vulnerability to the use of chemical or biological agents through the development of advanced technologies and capabilities. A key element of the program is the formulation of architectures that bring together operational and technological components to develop systems that address key elements of the chemical and biological threat. This program builds upon ongoing activities in other agencies, and addresses key areas in which DOE has expertise.

Preparing and ultimately responding to the use of chemical or biological agents is a complex problem to which there is no "silver bullet". Because of these challenges, chemical and biological terrorism is most effectively addressed in an end-to-end, layered approach. Such a layered approach must involve deterring the use of such weapons, preparing key facilities and cities for the possible use of such agents, having systems in place to rapidly detect the use, and should use be detected, being able to effectively respond. Technology is a key component of all of these areas-our initiative focuses on the development of enabling technology to dramatically improve the U.S. ability to prepare for and respond to the use of such weapons, and on a close linkage between technology development and systems analysis and integration efforts.

The chemical and biological nonproliferation R&D initiative builds upon over $1 billion per year that DOE invests in related technologies and the chemical and biological sciences in areas that range from genomic sequences, to the development of new DNA diagnostics, to advances computer simulation tools. The DOE efforts are complementary to, and closely linked (via formal coordination mechanisms) to those of the DoD and other agencies.

Funding Schedules

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Deterrence and Detection Technologies	62,036	62,085	74,000	+8,915	13.7%
Total, Deterrence and Detection Technologies	62,036	65,085	74,000	+8,915	13.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Deterrence and Detection Technologies			
■ Radiation Detection: Develop and maintain the technology base for key radiation detection and characterization technologies and systems which underpin U.S. national security capabilities in the areas of safeguarding nuclear material, combating terrorism, nonproliferation, and arms control. Develop innovative concepts to increase sensitivity, resolution, range, fieldability, and simplify system operations and interpretation of data. Develop, integrate, and demonstrate high resolution radiation detection systems which operate at room temperature or with compact coolers, systems with the capability to detect special nuclear material at long ranges, and detectors with novel hardware and software information barriers to protect sensitive weapons information for systems used with international organizations or international agreements.	16,768	16,151	14,975

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Materials Analysis: Develop advanced field and laboratory capabilities for the detection and analysis of proliferation-related activities primarily in support of the law enforcement, intelligence, and arms control communities. Advance the state of technology in both field and laboratory forensics analysis applied to weapons of mass destruction and other threats to national security. Develop automated gaseous and particulate collection systems and integrate with automated in-field analysis capability for possible remote, unattended operation. Develop novel approaches to enhance the capability of new sensor systems to discriminate between proliferation chemicals of interest and "normal" background. Develop innovative ways to reduce the per sample cost for laboratory analysis.	12,405	12,763	11,600
■ Micro Technologies: Develop micro technologies which will enable the miniaturization of detection and analysis systems that can be readily deployed with a human operator or can be operated remotely and/or unattended in support of law enforcement, intelligence, and arms control missions. Develop and demonstrate prototype miniature chemical sensors, arrays of micro-sensors, and "smart" networks which will reduce false alarms and enhance the probability of detecting activities of concern.	14,865	12,955	11,500
■ Chemical and Biological Nonproliferation: Development of advanced technologies to respond to the chemical and biological threat. Critical research to develop and test fast and selective detection technologies, predictive plume transport models suitable for urban areas, new recovery and restoration concepts, and advanced biological forensics methods for proliferation detection and attribution.	17,998	18,497	31,152
■ SBIR/STTR: Funding for the SBIR and STTR programs are contained in the Detection and Deterrence Technology subprogram. In FY 1998, $5,141,000 was transferred to the DOE SBIR and STTR programs. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of these programs	0	4,719	4,773
Total, Deterrence and Detection Technologies	62,036	65,085	74,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Deterrence and Detection Technologies	
■ Chemical and Biological Nonproliferation: Due to the increased threat of potential terrorist use of chemical and biological weapons, the Nonproliferation and Verification R&D program has refocused priorities	+12,655
■ The Materials Analysis, Micro Technologies, and Radiation Detection activities have been reduced to offset the priorities of the Chemical and Biological Nonproliferation program and the construction of the Nonproliferation and International Security Center at LANL	-3,794
■ SBIR/STTR	+54
Total Funding Change, Deterrence and Detection Technologies	+8,915

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	2,971	4,411	4,300	-111	-2.5%
Total, Capital Operating Expense	2,971	4,411	4,300	-111	-2.5%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
00-D-192, Nonproliferation & International Security Center, LANL	58,769	0	0	0	6,000	52,769
Total, Construction		0	0	0	6,000	52,769

00-D-192, Nonproliferation and International Security Center (NISC), Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request (Preliminary Estimate)	1Q 2000	1Q 2001	4Q 2001	2Q 2003	58,769	62,656

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriation	Obligations	Costs
Design			
2000	6,000	6,000	3,198
Construction			
2001	7,000	7,000	6,724
2002	36,000	36,000	30,312
2003	9,769	9,769	18,464
2004	0	0	71

3. Project Description, Justification and Scope

Proposed construction project - We live in a rapidly changing world in which threats involving the proliferation of weapons of mass destruction (NBC - nuclear, biological and chemical) and their potential use by rogue states or terrorists loom over all of us. The Department of Energy Office of Nonproliferation and National Security (DOE-NN) and the Office of Intelligence (DOE-IN) have the responsibility for major programs to counter these threats. Most are time urgent and have sensitive national security implications. For example, controlling nuclear materials in states of the Former Soviet Union, verifying the Comprehensive Test Ban Treaty (CTBT), countering nuclear smuggling,

safeguarding nuclear materials and weapons and, most recently, countering threats involving chemical and biological agents and helping enable the START process to continue downsizing nuclear weapon stockpiles. These programs are truly important to the security of the United States and the world, and the national laboratories through DOE-NN and DOE-IN are the major agents responsible for carrying out this work.

Los Alamos supports these DOE-NN and DOE-IN programs through: 1) a diverse and robust R&D program to develop detection systems and technology; 2) assessing foreign nuclear weapon capabilities and responding to nuclear-related emergencies; and 3) for many years, providing much of the technology and expertise needed to verify treaties and implement various safeguards regimes to ensure compliance with terms and conditions of treaties and agreements. In 1993 the Laboratory consolidated major programs and capabilities in detection R&D, intelligence, nuclear safeguards and emergency response into a new organization called Nonproliferation and International Security (NIS). This organization is the laboratory's prime responder to DOE-NN and DOE-IN programmatic needs, including approximately $100 million per year in funded effort for DOE plus about $25 million in related work for other federal agencies. Unfortunately, the full benefit of this synergistic organization has been handicapped by being located in facilities scattered across the 43-square-mile Los Alamos site. Many NIS operations are performed in substandard facilities. The Laboratory Capital Assets Management Plan (CAMP) ranks the quality of all Laboratory space using six Condition Assessment Survey codes ranging from "Excellent" down to "Fail". Of the groups proposed for consolidation in the new facility, 74% are currently in space classified as "Poor", "Fail", or "Fair". The 50 buildings housing NIS personnel include many "temporary" trailers and transportables. These old and substandard structures are energy inefficient, and they are a negative factor in recruiting top scientific staff as we try to maintain our status as a world-class laboratory and division.

Based on a recent study of a similar R&D organization (Kraut, Robert E., Carmen Egido, and Jolene Galegher, "Patterns of Contact and Communication in Scientific Research Collaborations," Intellectual Teamwork - Social and Technological Foundations of Cooperative Work (Lawrence Erlbaum Associates, Inc., New Jersey, 1990), Chap.6.) the following improvements in scientific collaborations and technical communications are projected:

- Increases in number of scientific collaborations - Collaboration rate strongly facilitated. Upper speculative bound is 87% increase. Likely increase is at least 10%.
- Increase in frequency of technical communications - Collaboration increase exponentially with proximity. Internal communications will at least double and very likely will increase by much more than double.

In addition, the study provided a preliminary estimate of the following less dramatic but quantifiable productivity improvements in addition to the non-quantifiable but very significant scientific creativity and productivity gains:

- Savings in support-function consolidation - 0.85% of NIS labor budget (about $0.5 million per year).
- Savings of intra-division travel time - 2.0% of NIS labor budget (about $1.2 million per year).

Los Alamos proposes to consolidate this unique national resource physically as well as organizationally near the Laboratory hub by co-locating all NIS activities in new and existing facilities within convenient walking distance in TA-3 (except for the high-security nuclear activities in TA-18/36 and the Center for International Security Affairs in TA-66, neither of which would be desirable or practical to move). The CAT I nuclear operations at TA18/36 have special security and safety requirements that would be very difficult to move. The activities at TA66 require open access by foreign nationals and can not be conducted in the secure NISC facility. To accomplish this consolidation will require the construction of a major new facility – the Nonproliferation and International Security Center (NISC). This consolidation will enhance program synergy and effectiveness by co-location of the NIS nonproliferation, arms control, treaty verification, and intelligence functions near the scientific, technological, and information sources that support these programs.

Los Alamos will initiate Title I/II design in FY2000. This schedule is necessary because of several urgent new requirements to which DOE-NN and DOE-IN must respond and to which the full capabilities of the national laboratories, especially Los Alamos, must be applied. Specific examples include:

- Former Soviet Union (FSU), Nuclear Materials Protection, Control, and Accounting (MPC&A) Program B - The threat to U.S. national security from the loss of significant quantities of FSU nuclear material has been reduced but is far from eliminated. Until these vast amounts of material are safeguarded fully, this threat remains grave.
- Helsinki Agreements - Agreements reached recently by Presidents Clinton and Yeltsin in Helsinki, including preliminary START III treaty parameters, add significantly to the technical challenges facing DOE-NN and DOE-IN.
- Comprehensive Test Ban Treaty (CTBT) Verification - The U.S. Senate soon will consider ratification of the treaty. Verification of international compliance with the terms of this treaty will be the major issue in the debate. Assuring the President and Congress that DOE can develop technologies to adequately verify the treaty is a political as well as a daunting technical challenge facing DOE-NN and DOE-IN.
- Nuclear, Biological, and Chemical (NBC) Proliferation and Terrorism - DOE-NN and DOE-IN are now responsible for developing and providing detection, assessment, and response technologies across the entire NBC spectrum. Reducing the NBC threat requires timely warning (intelligence) and advanced detection technology (monitoring). Adequate intelligence and monitoring require the application of leading-edge science and technology across a broad spectrum.

Los Alamos recently launched major efforts aimed at countering nuclear smuggling and chemical or biological weapons and is prepared to launch a major effort in support of the recent Helsinki Accords to continue the START process. NISC will give an appropriate focus and stature to Los Alamos efforts in nonproliferation, arms control, and national security commensurate with the contributions the Laboratory is making and on an equal footing with the Laboratory's historic nuclear weapons mission.

The NISC facility will be a new structure rising four stories above a one-level basement. A one-story high-bay area and basement will be provided on the west end of the structure. The high-bay area will be

used to support the development of special equipment and instruments. About 465 people will be housed in this 164,000 square foot facility. The second, third, and fourth floors each contain approximately 30,000 square feet. The ground floor includes about 36,000 square feet while the basement is around 37,000 square feet. The roof is accessible by stairs and freight elevator and this area is about 1,000 square feet. The fourth floor, housing intelligence activities, will be an accredited SCIF. Access to the SCIF will be limited to one location that will be controlled by a guard during normal operating hours. The third floor will contain program management and safeguard assessment functions. Anticipating that SCIF related activities could increase, the third floor will be constructed in such a manner that it could become an accredited SCIF in the future. Laboratories for physics, electronics, and instrumentation development along with technical work spaces and administrative functions will be distributed throughout the second and first floor, as well as the basement. Conference rooms will be provided on every floor with larger facilities being located on the first floor. A portion of the basement will be devoted to optic laboratories. In addition, the basement will house nuclear safeguard technology activities. These activities will be classified as radiological because of the use of sealed radioactive sources to execute their mission. The basement also will contain vaults to store the sealed sources including special nuclear materials (SNM). Two specially shielded rooms will be included for high radioactive research activities. These "special rooms" will require 5-ton bridge cranes. Because of the classified nature of many of the activities in this facility, the building, with the exception of the high bay area and machine shop, will be accessible to cleared personnel only.

A structural steel framing system of construction utilizing cost-effective design concepts will be employed to provide maximum open space, flexibility and economy for the upper floors of NISC. A 30 ft. x 30 ft. structural module was selected to accommodate a 10 ft. x 12 ft. office typical element. Floors will be concrete over metal deck supported by steel beams and girders. A 16 ft. floor to floor height was selected for the upper floors while the basement with its heavier industrial occupancy will be 20 ft., floor to floor. The basement walls will be constructed of reinforced concrete. Passenger and elevators service all floors. In addition to these elevators, an industrial type (10,000 lb.) elevator will service the basement from the loading dock outside the high-bay entrance. The high-bay also will contain a 10-ton bridge crane to accommodate the loading and unloading of heavy instrumentation. This bridge crane will extend outside the building and be able to operate on the loading dock. The building will be heated, cooled and ventilated from modular indoor air handling units on each floor. Chilled water will be provided for cooling while heating will be accomplished by hot water. Variable air volume (VAV) air conditioning units will deliver conditioned air to the occupied spaces. Units will provide a minimum amount of outside air at all times. When outdoor ambient conditions are favorable, an economizer cycle will provide "free" cooling with outside air. The same type of system will be included in the high bay and machine shop, but will be roof mounted. The main building chillers will also be located on the roof of the high bay structure. Temperature control will be from room thermostats. A complete packaged direct digital control (DDC) automatic temperature control system will be included. Roof drains will be connected to site storm drain system. Roof drains will be de-coupled as they penetrate the roof, fourth floor, and third floor. An automatic wet-pipe fire protection system will be extended throughout the building. The system will be hydraulically designed and conform to NFPA 13 for Ordinary Hazard Group II as a minimum or as determined PHA. Plumbing fixtures including electrical water coolers will be selected to provide access to individuals with disabilities. The building will require the installation of

a 3-phase outdoor unit substation that will include walk-in switchboard. Power will run to each electrical room where it will be distributed. Isolation power will be available for sensitive electronic equipment and computer loads. Power will be distributed throughout the building at 480Y/277V and 208Y/120V. Motors one horsepower or greater will be supplied with power at 480V. Generally, lighting will be flourescent and powered at 277V. The building will be equipped with communication systems that include telephone, open data communications, and a protected transmission system. The SCIF will require an internal warning light signaling system as well as an intrusion alarming system.

Site improvements will include a new service drive to access the high bay assembly area and machine shop functions as well as normal deliveries. A concrete walk with steps will provide pedestrian access to the main entrance to the building. Disabled access will be provided by means of a concrete walk with appropriate ramps. Existing surface drainage and new building roof drainage will be conveyed to existing storm drainage systems. The site, which is a one square block parking area, contains three office-transportable structures as well as a vacated gasoline refueling and service facility. Removal of these facilities will enable parking facilities to be expanded. Gasoline storage tanks, fuel lines, and pumps were removed by the Laboratory in 1997 and will not be part of NISC construction project. Existing asphalt paving will be removed and the site will be regraded. Access drives and parking areas will receive base course and asphaltic concrete paving. The parking areas will be stripped to accommodate approximately 956 cars. The NISC will be built on a current shared parking lot. The parking lot will be restored to accommodate approximately the original number of cars. Non-paved areas surrounding the building will be landscaped. Landscaping will consist of ground cover and trees similar to those on site. All landscaped areas will be irrigated by an automatic underground system.

Water service for both portable and fire protection will consist of an 8-inch pipe construction, approximately 320 feet long, into an existing 10-inch water main that lies adjacent to the site. A new 6-inch sewer line approximately 320 feet long will convey sanitary waste from the new building to an existing manhole. An existing 8-inch steam line with a 4-inch condensation line is located across the street from the building site. These lines will be connected together at a steam pit south of the building from which a 4-inch steam line and 3-inch condensation line will be extended into the building. A 2500-kVA, 13.2KV-480Y/277V, 3-phase outdoor unit substation, which will include a walk-in switchboard with secondary feeders routed to each of the basement electrical rooms, will be located along the north side of the building in the area of the electronics equipment lab. Power to this unit substation will be an underground feed from 13.2KV circuit. The primary feeder cable to the new unit substation will be 3-#4/0 15KV shielded, type MV90 conductors approximately 200 ft. in length and run in a concrete encased ductbank to switchgear unit.

NISC will vacate space in all or parts of seven permanent structures at both the TA-35 and TA-3 Technical Areas. The vacated space will be available for use by other DOE projects at Los Alamos. In addition, about 24 trailers and transportables, representing about 27,096 square feet will be removed and salvaged. Buildings in the TA-3 Technical Area to be demolished include SM-36 and SM-224. Demolition totals about 5,482 square feet.

Related Construction Project - The Strategic Computing Complex (SCC), an FY 2000 Line Item project, is designed to be constructed directly to the north of the proposed NISC project. The Laboratory's SCC and NISC teams will coordinate design of facility and site features to assure optimum configuration and compatibility of the two facilities as the designs are developed. In addition, construction execution issues will be addressed.

4. Details of Cost Estimate[a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	4,318	0
Design Management costs (0.52% of TEC)	304	0
Project Management costs (1.37% of TEC)	805	0
Total Engineering design inspection and administration of construction costs (9.23% of TEC)	5,427	0
Construction Phase		
Improvements to Land	2,588	0
Buildings	30,775	0
Special Equipment	2,030	0
Other Structures	0	0
Utilities	482	0
Standard equipment	3,483	0
Major computer items	0	0
Removal cost less salvage	418	0
Inspection, design and project liaison, testing checkout and acceptance	1,947	0
Construction Management (2.70% of TEC)	1,585	0
Project Management (2.41% of TEC)	1,419	0
Total Construction Costs	44,727	0
Contingencies		
Design Phase (1.33% of TEC)	781	0
Construction Phase (13.33% of TEC)	7,834	0
Total contingencies on NISC (14.66% of TEC)	8,615	0
Total, Line Item Costs (TEC)	58,769	0

[a]Cost estimate is based on Conceptual Design Report of July 1, 1998. Escalation is applied according to DOE approved escalation rates (FY98-2.4%, FY99-2.5%, FY00-2.6%, -FY01-2.6%, FY02-2.5%, FY03-2.6%,FY04-2.9%).

5. Methods of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by a fixed price contract awarded on the basis of competitive bidding.

6. Schedule of Project Funding

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility cost						
Design	0	0	0	3,198	2,990	6,188
Construction	0	0	0	0	52,581	52,581
Total line item TEC	0	0	0	3,198	55,571	58,769
Total Facility Costs (Federal and Non-Federal)	0	0	0	3,198	55,571	58,769
Other Project Costs						
R&D necessary to complete construction	0	0	0	0	0	0
Conceptual design costs	619	0	0	0	0	619
Project execution plan	91	0	0	0	0	91
Decontamination and decommissioning	0	0	0	0	0	0
NEPA documentation costs	92	0	0	0	0	92
Other ES&H costs	98	0	0	21	71	190
Other project related costs	1,319	0	0	59	1,517	2,895
Total Other Project Costs	2,219	0	0	80	1,588	3,887
Total Project Cost	2,219	0	0	3,278	57,159	62,656
Less: Non-Agency Contribution	0	0	0	0	0	0
Total project cost (TPC)	2,219	0	0	3,278	57,159	62,656

7. Related Annual Funding Requirements[a]

	(FY 2003 dollars in thousands) Current Estimate	Previous Estimate
Facility maintenance and repair costs	4,345	N/A
Programmatic operating expenses directly related to facility	61,065	N/A
Total operating costs (operating from FY 2003 through FY 2007)	65,410	N/A

[a]Estimated life of project - - 20 years

Arms Control & Nonproliferation

Program Mission

Arms Control and Nonproliferation is the focal point within the Department for activities which support the President's arms control and nonproliferation policies, goals and objectives, as well as statutorily-mandated activities. The major functional areas of the program include: Policy and Analysis; Reduced Enrichment Research and Test Reactor (RERTR); International Safeguards; Export Control Operations; Treaties and Agreements; International Security; and International Materials Protection, Control, and Accounting (MPC&A). The program provides leadership and representation for the Department in the international arms control and nonproliferation community and the U.S. Government's interagency process, as well as for the U.S. Government in national and international arms control and nonproliferation negotiations, agreements and interactions.

Program Goal

Reduce the threat of nuclear proliferation by integrating and orchestrating the Department's assets and efforts, including those of its national laboratories and contractors, by providing major policy and technical support to the U.S. Government's foreign policy and national security objectives in the areas of arms control and nonproliferation, and to the international arms control and nonproliferation community. The Department provides policy and technical leadership for national and global nonproliferation efforts to reduce the continuing and new global nuclear dangers.

Program Objectives

- Secure Nuclear Materials and Expertise in Russia, the Newly Independent States (NIS), and the Baltics.
- Limit Weapons-Usable Fissile Materials.
- Promote Transparent and Irreversible Nuclear Reductions.
- Strengthen the Nuclear Nonproliferation Regime.
- Control Nuclear Exports.

Performance Measures

- For Russia, the NIS and the Baltics, continue International MPC&A upgrades at the 50-plus sites (including transportation systems) that use or store weapons-usable nuclear materials and maintain the original schedule to complete installation of all upgraded materials protection, control and accounting systems on 80-100 most vulnerable buildings by the end of calendar year 2002, including

training and operation arrangements of protection systems with the Russian Ministry of Interior (MVD).

- Replace unilateral nuclear export controls with multilateral controls. Initiate negotiations for the adoption of upgrades to multilateral export controls for nuclear-propulsion and nuclear weapons codes.
- Continue efforts to ensure transparent and irreversible nuclear reductions by supporting analysis and technology development for transparency activities related to START III and other initiatives focused on verified warhead dismantlement.
- Under Initiatives for Proliferation Prevention (IPP), engage weapons scientists, engineers and technicians in peaceful projects at their institutes.
- Complete ratification and implementation of U.S. protocol for International Atomic Energy Agency (IAEA) "Strengthened Safeguards System," including supporting U.S. responsibilities for declarations and on-site inspections at DOE facilities.
- Maintain integrity of long-term storage of the spent fuel canisters at Nyongbyon nuclear site prior to their removal from North Korea.
- Place additional U.S. excess nuclear weapons material under IAEA inspection under the "Trilateral Initiative;" develop IAEA verification regime for U.S. excess materials and Russian excess material to be placed in the Mayak Fissile Material Storage Facility.
- Transfer responsibility for all non-Russian nuclear facilities where material protection, control, and accounting upgrades have been completed to International Safeguards for continuing activities to sustain achievements.
- Complete the ratification and implementation of the Comprehensive Test Ban Treaty (CTBT), including supporting U.S. responsibilities for on-site inspections at DOE facilities.
- Maintain core competency as technical experts to U.S. Government (USG) agencies in nuclear export control discussions, through workshops and exchanges.
- Continue technical exchanges with China, consistent with USG policy.
- Engage the Baltics, Caucasus and Central Asia in nuclear export control initiatives.
- Continue leadership to reduce and limit the use of highly enriched uranium (HEU) and plutonium in civil energy fuel cycles, and especially those in regions or countries of proliferation concerns.
- Expand applications of cooperative monitoring as a methodology to reduce regional or bilateral tensions.
- Under the Nuclear Cities Initiative (NCI) assist in the development of suitable and gainful civilian employment for skilled scientific personnel in the 10 nuclear cities as Minatom begins to down size its nuclear weapons facilities.
- Complete canning operations for the Spent Fuel Activities in Kazakhstan by securing entire in-pool spent fuel inventory at the BN-350 reactor in Aktau, Kazakhstan. The in-pool inventory of 2000

assemblies will be secured in 400 welded stainless steel canisters and returned to in-pool storage under improved physical security and IAEA safeguards.

Significant Accomplishments and Program Shifts

- Rapidly expanded DOE's efforts to secure the hundreds of tons of nuclear material in Russia, the NIS and the Baltics in order to implement systematic and rapid MPC&A upgrades. Accelerated effort in the naval and transportation sectors. Also provided leadership to improve export control systems in these states.
- Implement IAEA verification on U.S. excess material to promote international confidence in irreversible removal of such material from weapons. Facilities under IAEA inspection include those for plutonium storage, HEU storage and HEU downblending. Increasing focus is being placed on developing international verification approaches for fissile material disposition programs.
- Broaden IPP engagement of institutes formerly engaged in development and production of biological and chemical weapons.
- After the completion of the canning of the spent nuclear fuel at Yongbyon, activities will shift to minimize the corrosion of the spent fuel and maintain the integrity of the storage canisters prior to removal from North Korea.
- Continue activities that strengthen the international nonproliferation regime by supporting such global treaties as the Nuclear Non-Proliferation Treaty (NPT) and the CTBT; advancing a negotiating mandate for the Fissile Material Cutoff Treaty (FMCT); promoting full compliance with the IAEA strengthened safeguards protocol; and progressing on START III and regional arms control programs in areas of high tension.
- Prepare U.S. facilities for transparent nuclear warhead reductions and assist Russian technical experts to develop methods and techniques for commensurate activities.
- Assist the CTBT Organization in development and refinement of the verification and on-site inspection regime to include conducting trial inspections at DOE facilities and cooperative activities with Russia and other key states.
- Spent Fuel Activities in Kazakhstan will complete canning operations at the BN-350 reactor in Aktau and activities will shift to completing system development and procurement of the cask transportation system to transport fuel canisters to the storage facility.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Arms Control & Nonproliferation					
Policy and Analysis	19,571	24,071	0	24,071	27,521
Reduced Enrichment Research and Test Reactor (RERTR)	6,222	6,000	0	6,000	5,822
International Safeguards	18,751	21,391	0	21,391	21,851
Export Control Operations	14,952	14,215	0	14,215	14,052
International Materials Protection, Control, and Accounting	137,008	140,082	0	140,082	145,000
Treaties and Agreements	3,528	3,813	0	3,813	3,583
International Security	34,568	47,328	0	47,328	78,171
Total, Arms Control & Nonproliferation	234,600	256,900	0	256,900	296,000

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	851	360	360	0	0.0%
Los Alamos National Laboratory	49,540	54,790	58,541	+3,751	+6.8%
Pantex	825	1,825	2,875	+1,050	+57.5%
Kansas City Plant	929	1,133	971	-162	-14.3%
National Renewable Energy Laboratory	2,322	1,837	1,677	-160	-8.7%
Sandia National Laboratory	47,749	48,316	52,452	+4,136	+8.6%
Total, Albuquerque Operations Office	102,216	108,261	116,876	+8,615	+8.0%
Chicago Operations Office					
Argonne National Laboratory	12,916	11,767	12,319	+552	+4.7%
Brookhaven National Laboratory	15,100	14,181	14,767	+586	+4.1%
New Brunswick Laboratory	260	260	260	0	0.0%
Total, Chicago Operations Office	28,276	26,208	27,346	+1,138	+4.3%
Oakland Operations Office	1,218	1,218	11,918	+10,700	878.5%
Lawrence Berkeley National Laboratory	2,074	1,662	1,551	-111	-6.7%
Lawrence Livermore National Laboratory	36,959	39,162	40,325	+1,163	+3.0%
Total, Oakland Operations Office	40,251	42,042	53,794	+11,752	+30.0%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	28,866	31,204	33,230	+2,026	+6.5%
Richland Operations Office					
Pacific Northwest Laboratory	27,486	29,305	31,317	+2,012	+6.9%
Idaho Operations Office					
Idaho National Engineering Laboratory	1,153	759	1,134	+375	+49.4%
Savannah River Operations Office	4,575	4,839	6,881	+2,042	+42.2%
Nevada Operations Office	290	290	220	-70	-24.1%
Washington Headquarters	1,507	13,992	25,202	+11,210	+80.1%
Total, Arms Control & Nonproliferation	234,600	256,900	296,000	+39,100	+15.2%

Site Description

Argonne National Laboratory

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations, particularly those related to the fuel cycle; training and assistance to Ukraine on export controls; and administers the Nonproliferation Graduate Program. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the Ukraine. In support of RERTR objectives, develops low-enriched uranium (LEU) fuels to convert research and test reactors; conducts safety analysis of reactors; expedites return of U.S.-origin research reactor spent nuclear fuel from overseas; develops processes for producing molybdenum-99; and develops advanced high-density LEU fuels for Russian/Chinese designed reactor. In support of International Safeguards, promotes peaceful use of atomic energy and bilateral nuclear cooperation efforts through "sister lab" arrangements. In support of IPP, creates nuclear/chemical/biological projects in the NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out NCI program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Brookhaven National Laboratory

In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, particularly at the Luch Site, and maintains the database of MPC&A site data and progress. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons material by assisting in the implementation of the U.S.-Russian agreement to shutdown production reactors, developing nuclear monitoring technology, and working with foreign nuclear programs to reduce all civilian use of plutonium and HEU; provides analytical and technical support to ongoing negotiations and in preparation for the implementation of agreements and treaties, such as the FMCT negotiations, by providing technical support related to safeguards/verification of fissile material processing, and hosts workshops to move negotiations forward in the Conference on Disarmament; and negotiates the implementation of HEU transparent and irreversible nuclear reductions to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials removed are not reused for military purposes. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: implementing an IAEA verification experiment on excess HEU downblending operation at Portsmouth Gaseous Diffusion Plant; and supporting DOE involvement in U.S. policy formulation for IAEA safeguards. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues,

provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Idaho National Engineering Laboratory

In the area of Policy and Analysis, supports START III efforts by maintaining the development of radiation signatures from U.S.-weapon systems based on enhancements to INEL-developed inspection technologies. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Kansas City Plant

In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Lawrence Berkeley National Laboratory

In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Lawrence Livermore National Laboratory

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluation, in particular, end user analyses and specific weaponization technologies; multilateral negotiation within the Nuclear Suppliers Group (NSG); and training and assistance to potential nuclear suppliers on export controls, with special emphasis on Russia and the Southern Tier States. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, especially for some Navy projects and large defense sites. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons material by assisting in the implementation of the U.S.-Russia agreement to shutdown production reactors, developing nuclear monitoring technology, and working with foreign nuclear programs to reduce all civilian use of plutonium and HEU; provides analytical and technical support to ongoing negotiations and in preparation for the implementation of agreements and treaties, specifically providing conference and technical support to the Biological Weapons Convention (BWC) compliance protocol; supports bilateral negotiations with Russia to implement transparent and irreversible nuclear reductions which would confirm that Russian nuclear weapons are being dismantled and the excess fissile materials that are removed are not reused for military purposes by providing technical and non-technical input on Warhead Dismantlement Regime Protocol for START III and Radiation Measurements technical input for the Laboratory-to-Laboratory and Mayak Transparency programs; provides detailed technical expertise on the nuclear weapons and nuclear power programs in states of proliferation concern and helps to formulate strategies in arms control, cooperative monitoring, and energy security used by the U.S. to prevent nuclear weapons testing and a nuclear arms race; promotes effective implementation of On-Site Inspections (OSI) under the CTBT by providing technical expertise in the areas of monitoring, development of equipment specification, procurement, and the conduct of inspection simulations; supports the interagency and U.S. delegations to the CTBT Preparatory Commission (PrepCom) and its verification Working Group; provides in expertise seismic monitoring, geophysical phenomena associated with nuclear testing, and nuclear weapons testing issues; participates in U.S. scientific cooperative programs with Russian and Chinese counterparts on non-weapons programs including exchanges in such areas as nonproliferation, arms control, and verification technology. In support of International Safeguards, improves the cost effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: supporting DOE representation on the U.S./Russia/IAEA Joint Working Group; identifying U.S. excess fissile material vulnerabilities; and operating the Information Tracking and Analysis (ITA) Program (consisting of ITA, Nuclear Materials Management and Safeguards System (NMMSS), and ITA-International) which tracks and analyzes U.S. and foreign nuclear activity to satisfy statutory requirements and international obligations and to support U.S. nonproliferation policy. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Los Alamos National Laboratory

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations, in particular the weaponization technologies; multilateral negotiation within the NSG; training and assistance to Kazakhstan and other NIS on export control laws; and provides for development and implementation of the Proliferation Information Network System (PINS) and the NSG Information Sharing System. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union. In support of RERTR objectives, provides technical support in the development of LEU targets, as an alternative to HEU targets, for use in the production of medical isotopes. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons material by assisting in the implementation of U.S.-Russian agreements to shutdown production reactors by providing staff for U.S. monitoring teams and technical support on monitoring plutonium; supports the DOE position for FMCT negotiations, by providing technical support related to Hanford site facilities and safeguards/verification of plutonium reprocessing; promotes effective implementation of OSI under the CTBT by providing technical expertise in visual (ground and air) inspections and geographic data integration; provides expertise in monitoring and nuclear weapons testing issues in support of the interagency and U.S. delegations to the CTBT PrepCom and its verification Working Group; participates in U.S. scientific cooperative programs with Russian and Chinese counterparts on non-weapons programs, including exchanges on such subjects as nonproliferation, arms control, and verification technology; as a design laboratory, supports the Warhead Dismantlement and Transparency program, specifically focusing on Mayak Transparency efforts in the development of radiation signatures. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: serving as the leading contributor for strengthening of nuclear safeguards in Asia and the Pacific Rim countries; participating in "sister lab" arrangements; assisting DOE in providing support to the IAEA for development and implementation of environmental sampling, unattended nondestructive assay systems, and remote monitoring systems; and developing technologies for safeguarding of nuclear materials declared excess to the U.S. and Russian weapons programs. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

National Renewable Energy Laboratory

In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve

other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

New Brunswick Laboratory

In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union.

Nevada Operations Office

In support of Policy and Analysis efforts, supports the interagency and U.S. delegations to the CTBT PrepCom and its verification Working Group for the implementation of the CTBT verification system and U.S. ratification of the Treaty; provides expertise and analysis during OSI and in the development of equipment specifications; and manages the conduct of inspections at the test site.

Oak Ridge National Laboratory

In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, particularly with a lead on some Navy projects. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: encouraging safeguards technology development through cooperation agreements with Latin American countries; participating in "sister lab" arrangements; improving techniques for analyzing environmental samples; providing technical support for the Subcommittee on Technical Program and Cooperation; and implementing IAEA safeguards at Oak Ridge. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of Policy and Analysis efforts, the Oak Ridge Y-12 facility, provides analytical and technical support to ongoing FMCT negotiations and preparation for the implementation of such agreements and treaties; provides technical support related to safeguards/verification measures and/or uranium enrichment processes and facilities; supports work with Russia to negotiate and implement transparent and irreversible nuclear reductions, to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials that are removed are not reused by demonstrating various transparency techniques, to analyze START III monitoring options at OR Y-12, and to manage all Laboratory-to-Laboratory program contracts focusing on analytical impacts on monitoring plants; provides detailed technical expertise on the nuclear weapons and nuclear power programs in states of proliferation concern and helps to formulate strategies in arms control, cooperative monitoring, and energy security used by the U.S. to prevent nuclear weapons testing

and a nuclear arms race. In support of Export Control Operations, the Oak Ridge Y-12 facility provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations, particularly fuel cycle technologies; multilateral negotiations within the NPT Exporters Committee; training and assistance to Russia on export controls and illicit trafficking; and to the interagency Nuclear Export Violations Working Group. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Oakland Operations Office

In support of the Democratic Peoples Republic of Korea (DPRK) Spent Fuel Activities, works to minimize corrosion of spent fuel and maintain integrity of storage canisters, prior to the spent fuel's ultimate disposition, in accordance with the October 1994 "Agreed Framework" signed by the U.S. and DPRK governments. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons material by assisting in the implementation of the U.S.-Russian agreement to shutdown production reactors, developing nuclear monitoring technology, working with foreign nuclear programs to reduce all civilian use of plutonium and HEU, and periodically reporting on nuclear materials in the U.S. that are subject to agreements; provides detailed technical expertise on the nuclear weapons and nuclear power programs in states of proliferation concern and helps to formulate strategies in arms control, cooperative monitoring, and energy security used by the U.S. to prevent nuclear weapons testing and a nuclear arms race. In support of International Safeguards, manages the ITA Program which tracks and analyzes U.S. and foreign nuclear activity to satisfy statutory requirements and international obligations and to support U.S. nonproliferation policy.

Pacific Northwest National Laboratory

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations, in particular those requiring DOE Part 810 authorization; training and assistance to potential nuclear suppliers on export controls and illicit trafficking, in particular Ukraine and Russia; and technology security. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, with emphasis on material control and accounting at various civilian sites and coordination with Russian Ministry of Interior (MVD) and Ministry of Atomic Energy (MINATOM). In support of the DPRK Spent Fuel Activities, provides fuel canning technical support, working in accordance with the "Agreed Framework" signed by the U.S. and DPRK governments. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons by assisting in the implementation of the U.S.-Russian agreement to shutdown Russian plutonium production reactors and storage sites, and by providing staff support during monitoring visits to shutdown U.S. production reactors at the Hanford site; provides analytical and technical support to ongoing negotiations and in preparation for the implementation of such agreements and treaties as the BWC Compliance Protocol and related technical papers, and for support to FMCT negotiations related to Hanford site facilities, safeguards/verification of plutonium reprocessing, and utilization of Hanford

facilities to demonstrate such approaches for fissile material reprocessing; supports U.S.-Russian bilateral negotiations for implementation of transparent and irreversible nuclear reductions in order to confirm that Russian nuclear weapons are being dismantled, and to ensure that excess fissile materials removed are not reused by providing a weapons design expert and Executive Secretary to the Mayak Transparency negotiations; provides detailed technical expertise on the nuclear weapons and nuclear power programs in states of proliferation concern and helps to formulate strategies in arms control, cooperative monitoring, and energy security used by the U.S. to prevent nuclear weapons testing and a nuclear arms race; promotes effective implementation of the CTBT verification system by providing technical expertise in the area of radionuclide monitoring. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: conducting technical consultations on information analysis software and hardware tools and expertise in environmental sampling and analysis; promoting the effective safeguarding of nuclear materials through bilateral safeguards agreements with Argentina, Brazil, European Atomic Energy Community (EURATOM), South Korea, and Japan, emphasizing information management and environmental sampling; and supporting the further implementation of IAEA safeguards at DOE facilities in the U.S. through the development of approaches, technical consultation to sites, trilateral discussions with the Russian Federation, and policy analysis. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Pantex

In support of International MPC&A, installs equipment and inventories nuclear materials, particularly at former nuclear weapons facilities. In support of Policy and Analysis efforts, supports Russian negotiation and implementation of transparent and irreversible nuclear reductions to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials that are removed are not reused for military purposes by specifically supporting Mayak Transparency Program efforts.

Sandia National Laboratory

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations, in particular, certain weaponization technologies; and training and assistance to potential nuclear suppliers on export controls, both domestically and abroad. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, with an emphasis on physical protection at various defense and civilian sites. In support of the DPRK Spent Fuel Activities, provides inspection tools and support to minimize corrosion of spent fuel and maintain integrity of

storage canisters, prior to the spent fuel's ultimate disposition, in accordance with the "Agreed Framework" signed by the U.S. and DPRK governments. In support of Policy and Analysis efforts, provides analytical and technical support to ongoing FMCT negotiations by providing technical physical protection support related to nuclear material safeguards/verification; supports U.S.-Russian negotiations to implement transparent and irreversible nuclear reductions, in order to confirm that Russian nuclear weapons are being dismantled and excess fissile materials removed are not reused for military purposes, specifically focusing on the Laboratory-to-Laboratory Dismantlement Transparency Program efforts; provides detailed technical expertise on the nuclear weapons and nuclear power programs in states of proliferation concern and helps to formulate strategies in arms control, cooperative monitoring, and energy security used by the U.S. to prevent nuclear weapons testing and nuclear arms race; provides technical expertise in the areas of inspections, data surety and authentication, and training programs; supports the interagency and U.S. delegations to the CTBT PrepCom and its verification Working Group; provides OSI expertise in key areas of the development of the CTBT International Data Center, protection of data transmitted, and verifiable assessments; participates in U.S. scientific cooperative programs with Russian and Chinese counterparts on non-weapons programs, including such subjects as nonproliferation, arms control, and verification technology. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: providing technical support for IAEA and United Nations Special Commission (UNSCOM) inspections in Iraq; assisting DOE when it leads U.S. interagency physical protection visits; participating in International Physical Protection Advisory Service (IPPAS) mission of implementing physical protection improvement; and providing assistance to the IAEA in implementing remote monitoring systems to streamline nuclear safeguards. In support of IPP, creates nuclear/chemical/biological projects with NIS institutes to prevent "brain drain," facilitate broad access to former weapons facilities and openness between DOE laboratory scientists and their NIS colleagues, provide long-term commercial employment at NIS institutes, involve other USG agencies with similar interests, and enhance technology for environmental safety of nuclear materials. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Savannah River Operations Office

In support of Export Control Operations, provides unique technical support in the areas of nuclear and nuclear-related dual-use export license evaluations within its area of expertise (e.g., tritium production); and technology security and nonproliferation domestic training. In support of International MPC&A, installs equipment, inventories nuclear materials, and establishes a self-sustaining security infrastructure in the former Soviet Union, including the training of inspectors. In support of the DPRK Spent Fuel Activities, provides fuel canning site contractor to minimize corrosion of spent fuel and maintain integrity of storage canisters, prior to the spent fuel's ultimate disposition, in accordance with the "Agreed Framework" signed by the U.S. and DPRK governments. In support of Policy and Analysis efforts, supports the control and elimination of nuclear weapons by assisting in the implementation of the U.S.-Russia Plutonium Production Reactor Agreement (PPRA) by providing staff for U.S. monitoring teams to shutdown Russian plutonium production reactors and subject storage sites,

supporting monitoring visits to shutdown U.S. production reactors at the Savannah River Site, developing nuclear monitoring technology, and working with foreign nuclear programs to reduce all civilian use of plutonium and HEU. In support of International Safeguards, improves the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material by: developing verification techniques for excess fissile material storage and disposition options at the Savannah River Site; and supporting UNSCOM and IAEA Action Team by providing technical experts, analyses, equipment and training. In support of NCI, creates permanent commercial jobs to employ displaced nuclear weapons scientists and to carry out program objective of creating economic opportunities in the closed nuclear cities of the Russian Federation.

Policy and Analysis

Mission Supporting Goals and Objectives

Policy and Analysis provides technical expertise and analytical support for arms control and nonproliferation treaty and agreement policy formulation, negotiation, and implementation at DOE facilities and in regional security. Assistance is provided to the State Department for increased contact with potential proliferant states to explore motives driving proliferation aspirations, and to engage DOE technical resources for training, confidence-building measures, implementation and verification of treaties, cooperative monitoring, and application of technology to facilitate proliferation prevention and reversal of nuclear weapons buildup. Resources are applied for global and regional arms control and nonproliferation treaties (NPT, CTBT, FMCT) and cooperative analysis of nuclear fuel cycles that can destabilize international relations and threaten regional security. Analysis is performed on measures and verification options for a multilateral fissile material production cutoff convention and bilateral cutoff with Russia; implementing a reciprocal monitoring regime for U.S./Russian nuclear weapon dismantlement and fissile material disposition; developing and refining procedures for confirming stockpiles of materials removed from weapons, and alternative cost-effective dismantlement transparency, verification, and chain of custody measures. In addition, analysis is performed on verification of nuclear-weapon-free zones, securing HEU in the former Soviet Union (FSU), and regional confidence-building. Assistance is also provided for implementation of the U.S./Russian agreement for exchange of technical information on nuclear warhead safety and support of projects for continued employment of FSU scientists in non-weapon activities.

Performance Measures

- Limit weapons-usable fissile materials through worldwide stockpile reductions of plutonium and HEU, the shutdown of production reactors, focus on proliferation implications of and solutions for key nuclear fuel cycle decisions, and development and implementation obligations under Agreements for Cooperation with other states.
- Provide analytical and technical support to ongoing negotiations and in preparation for implementation of agreements and treaties on such issues as transparency, inspection of sensitive DOE facilities, and verification.
- Work with Russia to negotiate and implement transparent and irreversible nuclear reductions, to confirm that Russian nuclear weapons are being dismantled and to ensure that excess fissile materials removed from dismantled Russian nuclear weapons are not reused in new nuclear weapons. Core elements of this program include the Laboratory-to-Laboratory Warhead Dismantlement Transparency Program, HEU Purchase Agreement Transparency, Mayak Fissile Material Storage Facility Transparency, and START III.
- Continue to support technical programs on regional nonproliferation and security exchanges, involving such concerns as cooperative monitoring, verification, arms control and nonproliferation

training, and trans-border environmental impacts that erode regional stability in the Middle East, South Asia and Northeast Asia.

- Support CTBT implementation, including support for ratification, U.S. responsibilities in the PrepCom, and development of procedures for OSI both internationally and at DOE facilities.
- Continue U.S. scientific cooperative programs with Russian and Chinese scientific counterparts on non-weapons programs, including exchanges on such subjects as nonproliferation, arms control, and verification technology. Expand program to include other areas of concern consistent with USG policy.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Policy and Analysis	19,571	24,071	27,521	+3,450	+14.3%
Total, Policy and Analysis	19,571	24,071	27,521	+3,450	+14.3%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Limit Weapons-Usable Fissile Materials			
Under the direction of the U.S.-Russian PPRA, conduct seven monitoring visits to shutdown Russian and U.S. reactors, operating Russian reactors, and Russian Plutonium oxide storage facilities, and participate in two meetings of the Joint Implementation and Compliance Commission. Implement agreements for cooperation and peaceful uses of nuclear energy to include, exchanges of nuclear material accounting records, and international consultations.	1,520	1,520	1,520
Conduct eight weeks of negotiations, consultations anticipated to last several weeks, and maintain technical experts to support deliberations, studies, and domestic and international exercises and/or conduct multilateral verification workshops.	750	750	750
Program Objective—Promote Transparent and Irreversible Nuclear Reductions			
Promote transparent and irreversible nuclear reductions by working with the Russian Federation to negotiate treaty and other legally binding agreements which allows confirmation that Russian nuclear weapons are being dismantled and that excess fissile materials removed from dismantled Russian nuclear weapons are not reused in the production of new nuclear weapons. The core elements of this program include the negotiation of a START III Treaty, currently planned to begin immediately following ratification of START II by the Russian Duma, which will actually mandate the elimination of quantities of nuclear weapons in addition to further reductions in nuclear delivery systems. Through the Laboratory-to-Laboratory Warhead Dismantlement Transparency Program maintain a technical dialog with Russian scientific and technical organizations.	6,110	11,110	16,010

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program Objective—Strengthen the Nuclear Nonproliferation Regime			
Support technical and policy analysis efforts in nuclear weapons arms control, confidence building, and other regional security actions, and support activities such as the Cooperative Monitoring Center and other programs that promote regional stability, security, and nonproliferation efforts in South Asia, Northeast Asia, and Middle East regions consistent with USG policy.	6,550	6,200	5,500
Support CTBT ratification (testimony, Q&A's, briefings), provide technical experts to domestic and international meetings of the CTBT PrepCom and Working Group B, draft and refine procedures for OSI, conduct trial inspections and table top exercises, and continue cooperative CTBT related projects with Russia, China, France, and Israel.	2,196	2,196	1,846
Support scientific cooperative programs and exchanges with Russian and Chinese scientific counterparts on nonproliferation, arms control and verification technology, and continue to expand the program to include other countries and areas of concern.	2,445	2,295	1,895
Total, Policy and Analysis	19,571	24,071	27,521

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs.FY 1999 ($000)
Additional funds increase and expand U.S. access at Russian facilities under additional HEU Purchase Agreement transparency measures; provide for the evaluation and testing of START III radiation measurement technologies to ensure no release of classified information; and provide for lab-to-lab contracts with the Russians that require demonstration of their transparency technologies to the U.S.	+4,900
Reduce policy and technical support for arms control and nonproliferation cooperative monitoring and security exchange programs promoting regional stability in the Middle East, South and Northeast Asia; and limit cooperative monitoring and arms control training and information exchange workshops and conferences.	-700
Reduce CTBT support to the interagency preparatory committee and development of the on-site inspection teams.	S-350
Reduce support to U.S. scientific cooperative non-weapons programs.	-400
Total Funding Change, Policy and Analysis	+3,450

Reduced Enrichment Research and Test Reactor (RERTR)

Mission Supporting Goals and Objectives

RERTR supports development of LEU fuels to further LEU conversion of research and test reactors; expedited return of U.S. origin research reactor spent fuel from overseas; and development of targets and chemical processes for producing molybdenum-99 using LEU.

Performance Measures

- Continue cooperative activities with Russian laboratories on implementation of Russian agreements and the development of LEU fuels for Russia.
- Support the return of U.S.-origin spent nuclear research reactor fuel from abroad under the Environmental Impact Statement and the conduct of IAEA laboratory cooperation to facilitate receipt of U.S.-origin spent nuclear fuel.
- Conduct exchange visits with Chinese laboratories and cooperative exchanges with China on RERTR, as well as development of a joint plan for reactor conversion with China.
- Initiate development of high density LEU fuels for research reactors, and continue development of LEU targets for molybdenum-99 production, beginning with U.S.- Korean, and U.S.-Argentine cooperation on production using LEU.
- Continue conversion efforts of U.S. reactors and pursue cooperation on reactor conversion with Eastern Europe and South Africa.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
RERTR	6,222	6,000	5,822	-178	-3.0%
Total, RERTR	6,222	6,000	5,822	-178	-3.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Limit Weapons-Usable Fissile Materials			
Maintain the program's computational database, develop analytical capabilities, study foreign research and test reactors conversion of U.S. origin HEU, and study U.S. reactor conversion.	850	700	850
Develop fabrication techniques for research and test reactor fuels of very-high-density, low-enrichment uranium for use in research reactors unable to use current technology LEU fuels. Program is progressing from sample-size to full-size fabrication and testing to qualify new LEU fuels, and demonstrate the same performance with the new LEU fuels as achieved with current HEU fuels.	2,472	3,022	3,500
Provide alternative targets and chemical processes to allow use of LEU to produce molybdenum-99, fission-product for use in medical applications including develop target fabrication technology, chemical process technology for recovery and purification, and/or adapt technology for disposing of radioactive waste, and obtain FDA approval to market the drug using LEU instead of HEU.	800	800	800
Provide the Executive Branch with a technical/economic evaluation of each significant request for export of HEU, and support implementation of the U.S. Government's Foreign Research Reactor Spent Fuel Return policy.	150	150	150
Enable Russia to complete the Soviet Union RERTR program, established in 1978, by supporting Russian institutes participating in the program, providing reactor analyses and fuel expertise from U.S. experts, and jointly assessing the feasibility of converting Soviet-designed reactors, (e.g., in the Czech Republic, Hungary, Poland, Kazakhstan, Uzbekistan, Ukraine, etc.).	1,750	1,028	322

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Encourage establishment of a Chinese RERTR program by supporting the design and operation of research and test reactors that would use LEU fuel, supporting the development and fabrication of LEU fuels for Chinese-designed reactors, and converting from HEU to LEU fuels.	200	300	200
Total, RERTR	6,222	6,000	5,822

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Program scope regarding the conversion of Soviet-designed reactors is reduced.	-178
Total Funding Change, RERTR	-178

International Safeguards

Mission Supporting Goals and Objectives

International Safeguards provides policy and technical leadership and funds efforts to strengthen the nuclear nonproliferation regime, particularly with respect to global nuclear material security. These efforts improve the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material. New approaches, such as environmental monitoring, remote monitoring, and information management tools are addressed. Policy and technical support is provided to DOE program offices and sites for the implementation of IAEA inspection of U.S. excess material at DOE sites under bilateral and trilateral (with Russia) arrangements. Verification measures are developed, in coordination with the international Policy and Analysis activity and the DOE Office of Research and Development, for implementing the FMCT. IAEA technical assistance programs that promote peaceful use of atomic energy and bilateral nuclear cooperation efforts through "sister lab" arrangements are supported. Agreements for safeguards cooperation are negotiated and implemented for improved material protection, control, accountancy, and transparency with other countries, regions, and international organizations, including Argentina, Australia, Brazil, Brazilian-Argentine Agency for Nuclear Material Control and Accounting (ABACC), China, EURATOM, France, IAEA, Japan, South Africa, and South Korea. Manage the physical protection program to ensure that all countries that possess U.S.-origin nuclear materials are adequately protecting them against, theft, sabotage, and nuclear smuggling. Manage and operate the ITA Program (consisting of ITA, NMMSS, and ITA-International) which tracks and analyzes U.S. and foreign nuclear activity to satisfy statutory requirements and international obligations and to support U.S. nonproliferation policy. Transfer non-Russian facilities, where security upgrades have been completed under the International MPC&A program, to International Safeguards.

Performance Measures

- Provide technical experts, training and/or equipment to IAEA and UNSCOM for inspections in Iraq and/or North Korea.
- Provide technical advice, support, and technologies (e.g., environmental monitoring, remote monitoring, and information management tools) to IAEA for development of new strengthened safeguards policies and methods.
- Per the Nuclear Non-Proliferation Act (NNPA) of 1978, Section 202, provide training on safeguards and physical protection to nationals of nuclear developing countries, and lead USG teams on visits to countries with U.S.-origin nuclear material to ensure adequate physical protection.
- Analyze and implement policy on U.S., IAEA and Russian trilateral verification program to develop and apply IAEA measures on U.S. and Russian excess nuclear weapons material.

- Per Presidential Decision Directive (PDD) 41, continue IAEA inspections on current U.S. nuclear material under IAEA safeguards, and make additional excess fissile material available for IAEA inspections.
- Promote peaceful use of atomic energy through support to IAEA technical cooperation activities, sister laboratory arrangements, and promotion of NPT.
- Continue cooperation with South American, African, Asian, and European partners to strengthen safeguards on nuclear material.
- Provide physical protection technical assistance to countries with which DOE has bilateral agreements and to the IPPAS in order to prevent nuclear smuggling.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
International Safeguards	18,751	21,391	21,851	+460	+2.2%
Total, International Safeguards	18,751	21,391	21,851	+460	+2.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Strengthen the Nuclear Nonproliferation Regime			
Provide technical assistance to IAEA and UNSCOM for inspections in Iraq and North Korea through September 2000.	1,100	1,100	1,100
Provide remote monitoring systems in ten countries; conduct two strengthened safeguards workshops; support analysis of up to 250 Network of Analytical Laboratories samples; conduct tutorials and red team exercise; prepare Protocol declarations for 15 DOE sites; establish information management system for U.S. Strengthened Safeguards Protocol declarations; conduct security reviews at all 15 DOE sites.	3,700	4,740	4,900
Provide safeguards training to 30-plus participants from 20-plus countries; conduct two physical protection courses.	500	500	500
Implement U.S./Russian/IAEA Trilateral Initiative by representing DOE, on a quarterly basis, to the Joint Working Group; identifying excess fissile material attributes verifiable by IAEA; selecting, testing, and evaluating verification measurement technologies; developing information barrier technology to prevent disclosure of sensitive data to IAEA inspectors; developing, testing, and evaluating IAEA methods to monitor excess fissile material; and identifying U.S. excess fissile material vulnerabilities.	400	2,500	2,600
Implement the President's Excess Fissile Material Policy by maintaining the implementation plan, developing and negotiating techniques for excess fissile material storage and disposition options, and making additional excess fissile material available for IAEA inspection; implement U.S./IAEA Safeguards Agreement; establish safeguards approaches for three DOE sites, implement IAEA safeguards (36 inspections) at three DOE sites, implement IAEA inspection activities on HEU downblending operations at two facilities, and conduct three outreach tutorials and activities.	2,700	2,500	2,600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Chair monthly IAEA meetings; develop four technical training courses; develop five action sheets for sister laboratory agreements; establish one additional technology exchange arrangement.	550	550	550
Conduct Nondestructive Assay (NDA) course in China; conduct four safeguards meetings in China; conduct workshops for South American safeguards inspectors; complete five Japan safeguards tasks; complete NDA projects with Republic of Korea; complete construction of Japanese clean chemistry laboratory; evaluate two fuel transfer campaigns at Embalse; complete one site visit to each of five NIS countries.	3,401	3,101	3,201
Lead USG teams on visits to countries with USG-origin nuclear material and host visits by physical protection officials from four new countries.	400	400	400
Expand IPPAS missions to include one Latin American and one NIS country; provide four additional countries with physical protection assistance.	1,000	1,000	1,000
Operate ITA Program including NMMSS; develop new nuclear waste material accounting software; maintain minimal level of activity at NIS facilities.	5,000	5,000	5,000
Total, International Safeguards	18,751	21,391	21,851

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Additional funds for developing verification techniques needed at Savannah River; preparing for stabilization of Pu under safeguards at Hanford and Rocky Flats Environmental Technology Site (RFETS); implementing of strengthened safeguards support work with Korea; and implementing remote monitoring systems.	+460
Total Funding Change, International Safeguards	+460

Export Control Operations

Mission Supporting Goals and Objectives

Export Control Operations advance U.S. nonproliferation export control objectives by developing and implementing policies, regulations, and procedures to halt the spread of weapons of mass destruction and their related technologies; promote and extend multilateral-bilateral nuclear supply arrangements in support of U.S. nonproliferation policy; control the export of nuclear and nuclear-related equipment, materials, and technologies as mandated by law and in accordance with national security objectives; and provide leadership, unique technical expertise, and training for the U.S. and international nonproliferation communities.

Performance Measures

- Continue government-to-government export control initiatives and on-going lab-to-lab cooperative agreements to develop the necessary infrastructure to ensure control over nuclear and nuclear-related dual-use equipment, material, and technology in Russia and the NIS.
- Participate in DOE, USG, and multilateral initiatives to combat nuclear smuggling and the illicit transfer of technologies for the production and utilization of special nuclear material as well as dual-use technologies in Russia and the NIS.
- Review and provide recommendations to the Nuclear Regulatory Commission and the Department of Commerce on nuclear and nuclear-related dual-use export licenses, representing DOE on all interagency fora (e.g., the Advisory Committee on Export Policy and the Interagency Working Group on Nonproliferation and Export Controls) in support of mandated licensing policy responsibilities.
- Administer, for the Department, the controls on the transfer of technology and assistance under 10 CFR Part 810.
- Ensure the viability of PINS to support the DOE export license processing system. Continue development of analytical tools which support implementation of DOE's export licensing review responsibilities under the NNPA.
- Ensure that DOE surplus equipment and technology is disposed of in a responsible manner and that technology transfers are consistent with regard to U.S. nonproliferation policy.
- Establish a program to support U.S. Customs domestically with technical evaluations of nuclear and nuclear-related shipments; and U.S. Customs and the NSG through an NSG/Customs hotline to help aid in the interdiction of illicit transfers.
- Conduct technology security reviews for DOE-funded foreign travel, visits and assignments to DOE facilities, technical exchanges, and export of DOE-controlled technology.

- Serve as the principal U.S. agency in negotiating controls over nuclear and nuclear-related dual-use materials, equipment, and technologies, especially within the NSG and the NPT Exporter's Committee (Zangger Committee). Includes ongoing activities to harmonize unilateral and multilateral controls as mandated by PDD-13.
- Upgrade, implement and support a computerized information sharing system in the NSG for the timely sharing of export denials among the 35 subscribing governments of the dual-use regime.
- Serve as principal technical agency responsible for continued dialogue with China to develop an effective export control system.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Export Control Operations	14,952	14,215	14,052	-163	-1.1%
Total, Export Control Operations	14,952	14,215	14,052	-163	-1 1%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Secure Nuclear Materials and Expertise in Russia, the Newly Independent States (NIS), and the Baltics			
Conduct two to three export control workshops for government and technical officials in Russia, Ukraine, and Kazakhstan.	400	300	300
Initiate three technical studies on nuclear proliferation to strengthen export control practices in Russia, Ukraine, and Kazakhstan.	300	200	200
Ensure that three jointly-developed nuclear export control databases are operating and assisting authorities in export control license reviews in Russia and Ukraine; and develop a system for Kazakhstan.	400	300	300
Implement plans to educate nuclear producers and exporters on national and international norms of export control in Russia, Ukraine, and Kazakhstan.	400	300	300
Work with multilateral players via two seminars to engage export control officials in the Baltics and Southern Tier to familiarize them with export control procedures.	415	415	415
Implement a training program for 100-200 Russian border and custom officials.	400	400	400
Develop indigenous training courses that Russian technical experts and MINATOM officials can use in training 1,000-2,000 border and custom officials.	200	200	200
Identify and install appropriate customs/border equipment needed to help prevent illicit transfers from leaving Russia.	400	400	400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program Objective—Strengthen the Nuclear Nonproliferation Regime			
Participate in negotiations to control conversion technology associated with plutonium, uranium, and thorium (add six new controls to multilateral list). Also, investigate, via two technical studies, the likelihood to adding nuclear propulsion technologies to the control list. Technologies such as weapons simulation codes, which may be significant under stockpile stewardship programs, also will be considered for control on a multilateral level, resulting in up to 10 new controls for the multilateral list	1,885	1,848	1,885
In FY 1998, conducted two seminars in support of regional export control/NPT transparency seminars within the Western Hemisphere	100	0	0
Support activities associated with the USG implementation of the Enhanced Safeguards Protocol (93+2)	200	200	0
Continue development and dissemination of technical training tools (three new commodities guides) to support the multilateral regimes, as well as UNSCOM/IAEA Action Team's activities associated with the monitoring and control of exports and imports of nuclear and nuclear-related materials, equipment, and technologies	100	0	0
Upgrade the NSG Information Sharing System to meet current industry standards and expand its capabilities to allow subscribing governments (35 terminals) to share information documents with others	575	575	575
Program Objective—Control Nuclear Exports			
Review and provide more than 2,500 recommendations to the Department of Commerce on the dual-use commodities related to the non-nuclear weapons of mass destruction (WMD), which include chemical and biological warfare (CBW) and missile items, representing DOE on all the interagency fora, including the SHIELD for CBW and the Missile Technology Advisory Committee (MTAC)	6,282	6,282	6,282
Ensure that the downsizing and dismantlement efforts throughout the DOE complex and disposal of excess materials, equipment, and technology at multiple DOE sites proceed responsibly, in strict adherence to U.S. nonproliferation policy and without inadvertent support to proliferants	1,105	1,105	1,105

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Serve as the principal USG technical agency in continuing dialogue with China to develop an effective export control system within, including nonproliferation cooperation under the DOE/China agreement now being negotiated and three joint workshops of DOE laboratories and Chinese institutes.	100	0	0
Administer the Department's export control licenses (up to 50) on nuclear technology and services required by Section 57b of the Atomic Energy Act and implemented under DOE regulations 10CFR Part 810.	685	685	685
Implement an outreach program with five DOE weapons laboratories and contractors, providing guidance regarding export-controlled technology and U.S. export control regulations to DOE and the national laboratories.	1,005	1,005	1,005
Total, Export Control Operations.	14,952	14,215	14,052

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Terminate support activities associated with the USG implementation of the Enhanced Safeguards Protocol (93+2).	-163
Total Funding Change, Export Control	-163

International Materials Protection, Control, and Accounting

Mission Supporting Goals and Objectives

International MPC&A activities are designed to support cooperation under agreements established with Russia, the NIS, and the Baltics for the protection of "direct use" nuclear materials. The focus is on key facilities and institutions that possess or process significant quantities of nuclear weapons-usable materials that are of nonproliferation concern. Expertise in the planning and implementation of systems and procedures to enhance protection of such materials is provided. These activities support the integration of nuclear materials security equipment and procedures into systems that are effective and are maintainable and sustainable by the cooperating countries. Efforts also promote the diffusion of nuclear materials security technologies, concepts, and expertise to different types of operating facilities where systems will be implemented. International MPC&A activities enhance U.S. national security and reduce the threat of nuclear proliferation and nuclear terrorism by improving the security of all weapons-usable nuclear materials (not in weapons) in the FSU. The International MPC&A priority is to rapidly secure all material where it currently is kept. Goals include installing MPC&A equipment, beginning nuclear material inventorying, beginning to change the Soviet security culture and beginning to establish a self-sustaining security infrastructure. Funding provides for MPC&A upgrades for defense related sites in Russia including uranium and plutonium cities, the nuclear weapons complex, maritime fuel locations, and transportation vehicles. MPC&A upgrades for civilian and regulatory related sites in Russia including large fuel facilities, reactor-type facilities, regulatory systems and organizations, and training programs and centers are also funded. MPC&A upgrades in Kazakhstan, Ukraine, Belarus, Uzbekistan, Latvia, Georgia, and Lithuania were completed in FY 1998.

Performance Measures

- Continue International MPC&A upgrades at the 50-plus sites that use or store weapons-usable nuclear materials and maintain the original schedule to complete installation of upgraded materials protection, control and accounting systems on 80-100 most vulnerable buildings by the end of calendar year 2002.
- Complete installation of MPC&A upgrades at Russian Navy Sites including one Northern Fleet Site, one Pacific Site, three floating platforms, and two Navy regulations and training programs.
- Continue to sustain the MPC&A upgrades at the 12 completed reactor-type facilities to ensure successful operation.
- Complete railcar and truck transportation projects to secure material transport for at least 10 major nuclear weapons, naval, and large fuel facilities.
- Continue cooperation with the Russian Ministry of Interior (MVD) to ensure successful operation of completed physical protection systems, including approval and implementation of a joint DOE-MVD work plan.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
International MPC&A	137,008	140,082	145,000	+4,918	+3.5%
Total, International MPC&A	137,008	140,082	145,000	+4,918	+3.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Secure Nuclear Materials and Expertise in Russia, the Newly Independent States (NIS), and the Baltics			
Continue to install MPC&A upgrades for defense-related sites in Russia, including five major uranium and plutonium cities, three nuclear weapons complex sites, 10 Russian Navy projects, and security upgrades for 31 railcars and 50 trucks used for transporting nuclear material.	63,504	82,280	78,028
Continue to install MPC&A upgrades for civilian and regulatory-related sites in Russia, including six large fuel facilities, 14 reactor-type facilities, 10 nuclear regulatory projects, and six training and education projects.	63,900	54,802	41,668
Completed MPC&A upgrades at four sites in Kazakhstan, four sites in Ukraine, and five sites in the NIS, one each at Belarus, Uzbekistan, Latvia, Georgia, and Lithuania.	9,604	0	0
Install MPC&A upgrades at Russian Navy sites including one Northern Fleet site, one Pacific site, three floating platforms, and two Navy regulations and training programs. Cooperate with the Russian Ministry of Interior (MVD) in the operation of U.S.-installed physical protections systems at 80-100 facilities/buildings and continue infrastructure projects to sustain security upgrades over the long-term, including two in-country equipment manufacturing projects, three training projects, and two transportation systems projects.	0	3,000	25,304
Total, International MPC&A	137,008	140,082	145,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
MPC&A upgrades for defense-related sites in Russia: decrease is a result of rapid upgrades being completed on all 31 Russian railcars used to transport nuclear materials.	-4,252
MPC&A upgrades for civilian and regulatory-related sites in Russia: decrease is a result of rapid upgrades being completed at 10 reactor-type facilities.	-13,134
Increase required to complete rapid security upgrades and cooperation on projects not foreseen in 1996 resulting from unprecedented programmatic successes in other areas of International MPC&A cooperation, as well as emerging new high priority opportunities.	+22,304
Total Funding Change, International MPC&A	+4,918

Treaties and Agreements

Mission Supporting Goals and Objectives

The Treaties and Agreements subprogram supports implementation of bilateral or multilateral, Presidentially-directed or Congressionally-mandated arms control and nonproliferation initiatives, agreements and treaties. In addition, it provides for unexpected, unbudgeted responses to arms control and nonproliferation requirements of an immediate nature based on urgent U.S. national security needs, as well as preparations to meet new transparency or verification requirements arising out of ongoing negotiations that are consistent with U.S. national security and without compromising proliferation sensitive information.

Performance Measures

- Continue support for Russian and other FSU activities related to specific agreements such as those resulting form the Gore/Chernomyrdin and Gore/Kiriyenko Commissions; the HEU Purchase Agreement, and other opportunities to secure through purchase at-risk weapons-usable materials; and activities related to bilateral and trilateral excess fissile materials inspections among Russia, the IAEA, and the U.S.
- Support the Year 2000 NPT Review Conference and achieve the CTBT, the Chemical Weapons Convention (CWC), and the BWC; address unexpected requirements concerning treaty or agreement negotiations; and support activities in response to urgent U.S. national security requirements.
- Provide technical support and personnel to UNSCOM to ensure no re-initiation of WMD programs in Iraq.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Treaties and Agreements	3,528	3,813	3,583	-230	-6.0%
Total, Treaties and Agreements	3,528	3,813	3,583	-230	-6.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Objective—Secure Nuclear Materials and Expertise in Russia, the Newly Independent States (NIS), and the Baltics			
Provide support for Russian and other FSU activities, including work on converting three plutonium production reactors in Russia and other activities under the Gore/Chernomyrdin and Gore/Kiriyenko Commissions.	300	300	300
Program Objective—Limit Weapons-Usable Fissile Materials			
Support HEU purchase agreement (buying 500 metric tons of weapons-origin HEU), and other opportunities. Secure at-risk nuclear materials in the 15 former Soviet Republics.	500	500	500
Provide support to bilateral and trilateral activities to inspect 30 metric tons of excess plutonium and hundreds of tons of excess HEU.	1,000	1,000	900
Program Objective—Strengthen the Nuclear Nonproliferation Regime			
Support U.S. participation in the Year 2000 NPT Review Conference and PrepCom Conferences. Additional support for the CTBT Organization, the BWC and CWC.	1,500	1,785	1,655
Continue technical support to UNSCOM on Iraq.	228	228	228
Total, Treaties and Agreements	3,528	3,813	3,583

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Reflects minor reductions across the board to address shifts in priorities.	-230
Total Funding Change, Treaties and Agreements	-230

International Security

Mission Supporting Goals and Objectives

International Security supports the implementation of security commitments made by the Administration regarding the NIS of the FSU and the DPRK. Specific efforts are:

Spent fuel activities in the DPRK include arresting the corrosion of the spent fuel from the 5MW research reactor in Nyongbyon, North Korea; and safely canning and storing spent fuel prior to its ultimate disposition in accordance with the "Agreed Framework" signed by the governments of the U.S. and DPRK.

Spent Fuel Activities in Kazakhstan support the urgent security and storage requirements for plutonium-bearing spent fuel located at a reactor in Aktau, Kazakhstan. The objective of this activity is to secure approximately three tons of weapons-grade plutonium for long-term safeguard monitoring and storage.

The IPP in the NIS, transferred from Defense Programs, Weapons Activities in FY 1996, was designed to reduce the global nuclear danger through focused, cooperative projects involving the ten major DOE laboratories and science and engineering institutes in Russia, Ukraine, Kazakhstan and Belarus. Some of these projects will involve cost-sharing with U.S. industry. Major initiatives include preventing "brain drain" by engaging scientists, engineers, and technicians in non-weapons-related projects; motivating participation in proliferation prevention activities; facilitating continued access to NIS facilities through technical engagement with personnel; and establishing self-sustaining commercial linkages that will support future independent commercial projects and assure a Federal exit strategy. Cooperative, cost-sharing projects are aimed at establishing direct partnerships that will provide for long-term commercial employment of key scientists, engineers, and technicians.

The NCI contributes to nonproliferation goals and reduces the global nuclear danger in direct and concrete ways. By working closely with the Ministry of Atomic Energy of the Russian Federation (Minatom), the representatives of the government and private sectors of the United States will assist in the development of suitable and gainful employment in the commercial sector for skilled scientific personnel of the Russian nuclear complex. Of the approximately 170,000 employees who work directly at the nuclear weapons facilities in the ten nuclear cities of the Russian Federation, many are considered as potential proliferation risks due to their direct knowledge of nuclear weapons technology. These individuals will likely be among those who lose their jobs when the production of the weapons facilities is scaled back. It is in the U.S. interest to support Minatom in this undertaking to prevent the potential brain drain to countries with the means and the intention to gain access to nuclear technology.

Performance Measures

Spent Fuel Activities in the DPRK

- Implement long-term maintenance of water treatment and fuel canning equipment including crane maintenance replacement equipment, materials consumed in maintenance, fuel for site power and heat for winter visits; and associated shipping costs. Conduct on-site inspections in combination with follow-up trips to repair equipment or recan spent fuel if necessary.
- Carry out technical studies to analyze safety issues, characterize fuel, and develop disposition options. Train DPRK staff to maintain essential site equipment.
- Provide a trained team of U.S. experts to conduct regular health physics tests and maintain necessary certifications.
- Address and resolve problems with canister integrity, water clarity, and other issues which would impact IAEA safeguards activities.

Spent Fuel Activities in Kazakhstan

- Design and procure spent fuel cask transportation system for transporting spent fuel canisters from Aktau to Baikal-1 storage facility.
- Complete construction of underground silo storage facility for the fuel canisters at the Baikal site.
- Complete design and begin development and installation of the safeguards monitoring and physical protection systems for approximately 500 underground silos at the Baikal-1 storage facility.

Initiatives for Proliferation Prevention (IPP)

- Create cooperative, cost-sharing projects aimed at establishing direct partnerships which will provide for long-term commercial employment of key scientists, engineering, and technicians.
- Carry out other IPP project and support activities to keep NIS institutes viable as stable places of peaceful employment; to engage NIS weapons scientists, engineers and technicians in peaceful, commercial activities to prevent "brain drain;" to facilitate broad access to NIS chemical, biological and nuclear weapons facilities in order to achieve close 1/1 working relationships of DOE laboratory scientists and engineers with their NIS colleagues to promote openness and transparency; and to focus on "closed cities."
- Involve other agencies having similar technological interest, such as NIH, USDA, and Department of State in IPP projects.
- Conduct specific projects involving technologies, the development of which supports enhanced safety, security and accountability of nuclear materials (for example, neutron emission technology to counter nuclear smuggling).

Nuclear Cities Initiative (NCI)

- Create jobs in the civilian sector in each of the target nuclear cities for nuclear scientists, engineers and technicians.

- Work with Minatom in the diversification of the economy of the nuclear cities and in creating an environment for further business development.
- Carry out of a number of social initiatives including exchanges in medical, educational, and woman's leadership training programs undertaken in support of NCI job creation efforts.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Spent Fuel Activities in the DPRK	4,968	2,328	2,171	-157	-6.7%
Spent Fuel Activities in Kazakhstan [a]	0	15,000	16,000	+1,000	+6.7%
Initiatives for Proliferation Prevention (IPP) [b]	29,600	22,500	30,000	+7,500	+33.3%
Nuclear Cities Initiative (NCI) [c]	0	7,500	30,000	+22,500	+300.0%
Total, International Security	34,568	47,328	78,171	+30,843	+65.2%

[a] FY 1998 efforts funded at $10M from a combination of prior year balances and FY 1998 budget authority available to the Arms Control and Nonproliferation Program.

[b] FY 1999 efforts funded at $25M from a combination of prior year balances and $22.5M in FY 1999 budget authority, including $15M as requested, $4.5M from funding for International MPC&A, and $3.0M from funding for other Arms Control and Nonproliferation functional areas (RERTR, International Safeguards, and Export Control Operations).

[c] FY 1999 efforts funded at $15M from a combination of prior year balances and $7.5M in FY 1999 budget authority from funding for International MPC&A.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program Objective—Strengthen the Nuclear Nonproliferation Regime			
Spent Fuel Activities in the DPRK			
Provide equipment replacement and maintenance, and purchase fuel sources for equipment operation in the DPRK	2,468	1,028	1,028
Conduct two, two-week visits to perform on-site inspections, prepare for two additional follow-up visits to repair equipment, and perform several technical analyses on safety, fuel composition, and disposition	1,100	700	650
Provide two DPRK personnel maintenance training sessions, one refresher training course for U.S. experts, and up to three health physics tests	400	100	50
Resolve eight weeks of technical problems impacting IAEA activities	1,000	500	443
Total, Spent Fuel Activities in the DPRK	4,968	2,328	2,171
Program Objective—Secure Nuclear Materials and Expertise in Russia, the NIS, and the Baltics			
Spent Fuel Activities in Kazakhstan			
At the BN-350 Aktau reactor, secure 350 tons of spent fuel (3,000 individual assemblies) containing three tons of plutonium in 500 welded stainless steel canisters (six assemblies per canister). The 350 tons of spent fuel will be placed in a facility containing underground silos for long-term dry storage. Each of the underground silos will be instrumented with nuclear material safeguards technology in order to detect with continuous, unattended monitoring from a remote location, any diversion of the spent fuel material.	0[a]	15,000	16,000
Total, Spent Fuel Activities in Kazakhstan	0	15,000	16,000

[a] FY 1998 efforts funded at $10M from a combination of prior year balances and FY 1998 budget authority available to the Arms Control and Nonproliferation Program.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Initiatives for Proliferation Prevention (IPP)			
Under IPP, engage about 1,000 scientists, engineers, and technicians in 50 projects to provide long-term commercial employment at nuclear (MINATOM/Academy of Science) NIS institutes.	13,100	10,125	13,500
Engage about 200 scientists, engineers and technicians in 10 projects to provide long-term commercial employment at chemical/biological NIS institutes.	2,000	1,500	2,000
Engage about 700 scientists, engineers and technicians in 50 projects to prevent "brain drain" and promote openness between DOE laboratory scientists and their NIS colleagues at nuclear (MINATOM/Academy of Science) institutes.	7,100	5,325	7,100
Engage about 200 scientists, engineers and technicians in 10 projects to prevent "brain drain" and promote openness between DOE laboratory scientists and their NIS colleagues at chemical/biological institutes.	5,000	3,750	5,000
Create five projects involving other USG agencies with similar interests.	1,000	750	1,000
Create five projects involving technology to enhance environmental safety, security and accountability of nuclear materials.	1,400	1,050	1,400
Total, Initiatives for Proliferation Prevention (IPP)	29,600	22,500[a]	30,000
Nuclear Cities Initiative (NCI)			
Create approximately 1,000 permanent commercial jobs employing displaced nuclear weapons scientists and engineers.	0	5,000	20,000
Carry out program objective of creating commercial economic opportunities in the closed, nuclear cities of Russia.	0	2,500	10,000
Total, Nuclear Cities Initiative (NCI)	0	7,500[b]	30,000
Total, International Security	34,568	47,328	78,171

[a] FY 1999 efforts funded at $25M from a combination of prior year balances and $22.5M in FY 1999 budget authority, including $15M as requested, $4.5M from funding for International MPC&A, and $3.0M from funding for other Arms Control and Nonproliferation functional areas (RERTR, International Safeguards, and Export Control Operations).

[b] FY 1999 efforts funded at $15M from a combination of prior year balances and $7.5M in FY 1999 budget authority from funding for International MPC&A.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Spent Fuel Activities in the DPRK	
Reduce the number of technical analysis because technical data/information has been analyzed prior and during canning.	-50
Reduce training courses to half since DPRK and U.S. technical experts will have gained the skills need to performed the needed tasks during the four years of canning and the first year of implementing the long-term maintenance program.	-50
Reduce time spent on resolving problems impacting IAEA by one week because the main activities during long-term maintenance have been discussed and IAEA's position and comments will have been integrated into the long-term maintenance agreement.	-57
Total, Spent Fuel Activities in the DPRK	-157
Spent Fuel Activities in Kazakhstan	
Additional funds for Kazakhstan Spent fuel Activities to stabilize and secure fuel canisters and emplace them in underground storage silos under safeguards monitoring and physical protection systems for long-term storage.	+1,000
Initiatives for Proliferation Prevention (IPP)	
Funding increase supports commercialization by adding up to three Thrust II projects with chemical and biological institutes and up to five Thrust II projects with nuclear institutes.	+7,500 [c]
Nuclear Cities Initiative (NCI)	
Additional funds support implementation of the Russian NCI to facilitate restructuring of the Russian nuclear weapons complex and expand non-weapons sector economic opportunities for Russian nuclear specialists. This effort was endorsed at the July 1998 Gore-Kiryenko Commission meeting and it supports a government-to-government agreement signed by Secretary Richardson and Minister Adomov in September 1998.	+22,500 [d]
Total Funding Change, International Security	+30,843

[c] FY 1999 efforts funded at $25M from a combination of prior year balances and $22.5M in FY 1999 budget authority, including $15M as requested, $4.5M from funding for International MPC&A, and $3M from funding for other Arms Control and Nonproliferation functional areas (RERTR, International Safeguards, and Export Control Operations).

[d] FY 1999 efforts funded at $15M from a combination of prior year balances and $7.5M in FY 1999 budget authority from funding for International MPC&A.

Nuclear Safeguards and Security

Program Mission

The Nuclear Safeguards and Security Program provides effective policy, programmatic direction and training for the protection of the Department of Energy's (DOE) nuclear weapons, nuclear materials, classified information, and facilities. The program provides technology development and technical support to domestic safeguards and security activities as well as implementation of effective classified information and information control policies. The program will help ensure protection of certain critical national infrastructures against both physical and cyber attacks.

Program Goal

Support the National Security of the United States by assuring the effective, cost-efficient protection of the DOE's nuclear weapons, nuclear materials, classified information, and facilities against theft, sabotage, espionage, and terrorist activity.

Program Objectives

- Strengthen support to field elements to facilitate implementation of cost-saving safeguards and security measures.
- Develop Department-wide strategic and long-range planning for domestic nuclear safeguards and security.
- Modernize safeguards and security management information systems.
- Provide a domestic technology and systems development program to ensure the availability of state-of-the-art technical capabilities for the protection of sensitive DOE facilities, special nuclear materials, and national security interests including classified matter.
- Ensure availability of state-of-the-art technical capabilities for accountability and control of nuclear material recovered from disassembled nuclear weapons returned from the stockpile, and storage of special nuclear materials.
- Support the role of the Safeguards and Security Nonproliferation and National Security Institute (formerly the Central Training Academy).
- Develop programs to support the standardization and accreditation of physical security systems.
- Maximize public access to DOE information while protecting national security.

- Provide leadership in jointly assessing sector vulnerabilities, recommending remedial plans, and developing systems and plans for identifying, countering, and recovering from attacks.

- Build an effective partnership between government and infrastructure owners and operators, with increased sharing of information relating to infrastructure threats, vulnerabilities, and the interdependencies.

- Educate and inform decision-makers and private industry, government, and the general public about infrastructure assurance, especially the importance of protecting their own information.

Performance Measures

- Through the Nonproliferation and National Security Institute, conduct 148 safeguards and security training courses with approximately 176 iterations to protect domestic safeguards and security resources.

- Modify current technologies for safeguards and security applications or develop new technologies to reduce the backlog of documented and validated field user needs by about 50%.

- Begin classification guidance streamlining initiative, issuing 40 guides in the new format.

- Conduct two pilot vulnerability assessments to develop guidance for overall program direction.

Significant Accomplishments and Program Shifts

- Comprehensive continuous review and analysis of program requirements coupled with advances in safeguards and security technologies have resulted in millions of dollars in savings and cost avoidance for the Department, i.e., a heartbeat detector to automatically detect personnel hidden in vehicles, thus saving cost of protective force personnel physically searching each vehicle; portals to automatically detect the potential theft of special nuclear materials; automated information system alarms to automatically detect anomalous activities, evaluate them, and appropriately respond to prevent potential attacks to classified computer systems; continuous automated vault inventory systems to monitor and confirm the presence of special nuclear materials in storage rather than the expense and exposure from a physical inventory; and nondestructive assay measurement technologies to quantify special nuclear materials without removing materials from their containers.

- The Safeguards and Security program has been and will be the key deterrent in preventing major incidents (i.e., theft, sabotage, terrorist activity, etc.) across the complex at 16 domestic weapons sites.

- Enhanced training technology applications and applied a broader range of technologies to Departmental training, i.e., expanded use of interactive television, mobile training team, and televideo conferences to provide requisite training for a larger number of students without funding increases.

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- The Declassification program has played a key role in implementing the Department's Openness Initiative by maximizing public access to Departmental information while protecting our national security posture, thus rebuilding the public's trust in the Department of Energy.

- The DOE Information Assurance program continues support in deterring major incidents involving compromise of classified information in energy information. This includes expansion of information assurance forensics analysis capabilities to support investigations and prosecutions of unauthorized disclosures of classified information, unauthorized intrusions into departmental networks, and providing input into the information systems security technology development program to develop new technology in response to new, unidentified network intrusion methods. Also reflected is the transfer of approximately $1.3 million for activities developed under Technology and Systems Development to Operational Support in order to implement the classified information systems security program throughout the Department.

- Reallocated funding of $5.0 million, which supported a one-time effort in FY 1999 to eliminate vulnerabilities identified in the Department of Justice report on "Vulnerability Assessment of Federal Facilities," was transferred to the Technology Development Program primarily supporting efforts to correct vulnerabilities and evolving threats facing the Department.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Nuclear Safeguards and Security					
Operational Support	21,730	28,730	0	28,730	29,634
Technology and Systems Development	23,620	24,620	0	24,620	27,470
Classification/Declassification	1,850	1,850	0	1,850	1,996
Subtotal, Nuclear Safeguards and Security	47,200	55,200	0	55,200	59,100
Total, Nuclear Safeguards and Security	47,200	55,200	0	55,200	59,100

Public Law Authorizations:
P.L. 83-703, "Atomic Energy Act of 1954"
P.L. 95-242, "Nuclear Non-Proliferation Act of 1978"
P.L. 103.62, "Government Performance and Results Act of 1993"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	8,692	8,048	8,565	517	6.4%
Sandia National Laboratories	6,534	8,135	9,300	1,165	14.3%
Albuquerque Operations Office	7,813	7,813	9,013	1,200	15.4%
Total, Albuquerque Operations Office	23,039	23,996	26,878	2,882	12.0%
Chicago Operations Office					
Argonne National Laboratory	103	103	600	497	482.5%
Brookhaven National Laboratory	700	800	350	-450	-56.3%
New Brunswick Laboratory	50	0	0	0	0.0%
Total, Chicago Operations Office	853	903	950	47	5.2%
Idaho Operations Office	1,097	822	1,287	465	56.6%
Nevada Operations Office	105	550	1,200	650	118.2%
Oak Ridge Operations Office					
Oak Ridge Operations Office	2,748	2,056	2,563	507	24.7%
Oak Ridge Institute for Science and Education	563	563	563	0	0.0%
Total, Oak Ridge Operations Office	3,311	2,619	3,126	507	19.4%
Richland Operations Office	2,437	2,237	2,892	655	29.3%
Oakland Operations Office					
Lawrence Livermore Laboratory	6,447	6,137	8,539	2,402	39.1%
Rocky Flats Area Office	0	0	200	200	100.0%
Savannah River Site	0	600	1,400	800	133.3%
Washington Headquarters					
Office of Scientific and Technical Information	40	40	0	-40	-100.0%
Washington Headquarters	9,871	17,296	12,628	-4,668	-27.0%
Total, Washington Headquarters	9,911	17,336	12,628	-4,708	-27.2%
Total, Nuclear Safeguards and Security	47,200	55,200	59,100	3,900	7.1%

Site Description

Los Alamos National Laboratory

Work at Los Alamos National Laboratory (LANL) is designed to address current, evolving, and future needs, primarily in the areas of materials control and accounting (MC&A) and computer security. Activities in MC&A include the development of measurement technologies and instrumentation to quantify difficult-to-measure or shielded special nuclear materials. LANL also develops standards for special nuclear materials to calibrate instruments around the complex. Other activities include evaluating commercial measurement systems and the development of MC&A training. Computer security efforts are focused on developing a capability to perform classified processing across multiple platforms and participation in the tri-laboratory effort to automatically detect suspicious activities on computer networks and automatically provide a response capability. Support is also provided for the Declassification Productivity Initiative by providing automated tools that improve the efficiency of document classification/declassification reviews.

Sandia National Laboratory

Sandia focuses on development of technologies and systems required to protect the Department from catastrophic consequences such as use of nuclear energy for malevolent purposes or the erosion of national security secrets through theft or diversion of classified materials or information. Technical assistance is provided for assessment of site vulnerability analysis and site safeguards and security plans. Support is also provided for the Declassification Productivity Initiative by providing automated tools that improve the efficiency of document classification/declassification reviews. The technology development program focuses on physical security technologies to secure the DOE complex. Activities include providing new detection capabilities to automatically detect unauthorized access, explosives, or other contraband. Sandia will develop advanced barrier technologies to prevent or substantially delay attacks. Technological solutions will also be provided to address new threats, such as chemical and biological weapons. In addition, Sandia will continue to maintain a core technical capability in interior and exterior sensors, alarm communications, access delay, and entry control. Computer security activities include participation in the tri-laboratory effort to automatically detect suspicious activities on computer networks and automatically provide a response capability. Assistance is also provided in developing comprehensive classification guidance for nuclear safety, ES&H, and dismantlement/reuse; reviewing declassification proposals and field office classification appraisals; and updating nuclear weapon guides.

Argonne National Laboratory

Argonne provides technical and programmatic development assistance in support of DOE's initiative to establish an effective national infrastructure assurance program that is supportive of, and harmonized, with national infrastructure assurance efforts.

Brookhaven National Laboratory

Brookhaven supports the technology development program in the area of material control and accounting to increase assurance regarding special nuclear materials and other fissile materials by developing measurement capabilities for fuel.

Idaho National Engineering and Environmental Laboratory (INEL)

INEL provides Idaho-based field expertise, technical assistance, and engineering support for the development, review, evaluation, and implementation of security-related requirements to effectively meet DOE's goals. This includes review and evaluation of security design requirements to support nonproliferation; engineering support for validation, justification, and site safeguards and security plan reviews; and development and refinement of security design criteria.

Nevada Operations Office

Activities will be conducted at the Remote Sensing Laboratory and the Special Technologies Laboratory. Activities will focus on evaluating existing and new measurement technologies to determine their feasibility at DOE sites. Efforts also include developing technologies to assist protective force personnel, including night vision goggles and investigating the use of ultraviolet tags to differentiate between the adversary and site personnel.

Oak Ridge, Lockheed Marietta Energy Systems

At Oak Ridge, technical assistance is provided for the development, maintenance, and conducting of courses and workshops that evaluate and ensure Information Systems Security certification; Master S&S Agreement/Site S&S Plan verification/validation; and physical protection systems. The technology development program support in physical security and material control and accounting addresses needs for protecting nuclear weapons, nuclear material, classified information, and other vital DOE assets (nonnuclear and unclassified). Expertise is provided in the document classification/declassification initiative and for classification guidance update and streamlining. The Declassification Productivity Initiative is supported by providing automated tools that improve the efficiency of document classification/declassification reviews.

Oak Ridge Institute for Science & Education/Oak Ridge Associated Universities

At Oak Ridge, technical support provides implementation, training, operation, and quality assurance of the Personnel Security Assurance Program, and a variety of research and analysis activities in support of the personnel security function. Technical assistance supports the classification/declassification program in the verification for review of classified and historical information for accuracy and compliance with DOE's openness policy.

Richland, Battelle Memorial Institute/Pacific Northwest Laboratory (PNL)

PNL provides technical expertise, assistance, training, and awareness in support of information security. This includes the identification, inquiry, and resolution of security problems across DOE; and analysis of incidents and facility survey information. They also assist with the implementation of the Department's information assurance initiative and related activities to ensure effective and efficient identification of threats and vulnerabilities to DOE's distributed information and telecommunication systems. Technical assistance is provided that supports special nuclear material consolidation, Master S&S Agreement, Site S&S Plan support, and vulnerability assessment reviews and performance testing.

Richland, Fluor-Daniel Hanford

Provides Hanford-based field expertise, technical support and assistance for the review, update and consolidation of safeguards and security orders and policies and field guidance to cost effectively meet department goals and objectives. Support is provided for the classification/declassification initiative by improving the access capability to DOE's OpenNet data base.

Lawrence Livermore Laboratory (LLNL)

Technical support is provided for DOE's Information Systems Security Program for analysis and recommendations for policies, guidance, and information assurance tool development for all aspects of information systems security. The technology development program at LLNL is concentrated in computer security, physical security, and materials control and accounting (MC&A). LLNL provides the Department with many tools to detect and respond to attacks to information system networks. The laboratory is also a participant in the tri-laboratory effort to automatically detect suspicious activities on computer networks and automatically provide a response capability. Physical security activities focus on providing software and interface upgrades to the Department's standardized access control system and evaluating low cost access control technologies for implementation throughout the DOE. In MC&A, measurement solutions for heterogeneous materials are being developed and implemented around the complex. Classification/declassification is supported through development of operational tools to improve the productivity of document reviewers.

Savannah River Site

Work at Savannah River supports materials control and accounting through the development, deployment and operation of a fully developed, ready to use, software application for nuclear materials accounting throughout the DOE complex. This technology will allow for greater reliability, efficiency, and cost savings through increased standardization and use of advanced software technologies. The classification/declassification program is supported through the development and streamlining of classification guidance.

Operational Support

Mission Supporting Goals and Objectives

Safeguards and Security Operational Support provides essential technical and analytical expertise to ensure effective and efficient security; a protective force for Headquarters operations; reviews which ensure cost-saving measures in safeguards and security throughout the Department; and standardized training responsive to the challenges of the changing post-cold war era. This support provides for the overall improvement of safeguards and security activities.

Subprogram activities in this section of the budget include the following:

- **Nonproliferation and National Security Institute (NNSI) (formerly Central Training Academy)** is the Center of Excellence for safeguards and security training and training development. NNSI uses both traditional and distance learning technologies to provide onsite and facility training for safeguards and security personnel ensuring that DOE maintains a well-trained workforce to protect the nation's vital nuclear and energy interests against espionage, sabotage or theft. NNSI assesses safeguards and security field training needs and site training program performance and develops training courses to meet those needs. Distance Learning Training includes satellite transmission of NNSI training to multiple DOE sites and, through the use of modern interactive technology, allows each student to be part of the instructional process. Computer-based training, interactive audio/video training and correspondence courses are also provided.

- **Information Security** provides support across the department in the areas of classified matter protection and control, technical security, information systems security (information assurance), operations security, and foreign ownership, control or influence. The accelerated information assurance program will provide a capability for ensuring that the resources and methods necessary to identify and prosecute unauthorized intruders of departmental networks are effective and available. The information assurance activities will also provide a capability to evaluate proposed security measures within the Department's complex network environment. The Information Security Resource Center (ISRC) incorporates technical expertise and professional development training to ensure that the five disciplines of information security function in an integrated, cohesive manner. The Technical Surveillance Countermeasures (TSCM) program, one of the five disciplines, ensures and enhances the security provided for Departmental facilities and programs in the greater Washington, D.C. area. The Information Assurance Outreach Program provides a vehicle for providing technical expertise, assistance, and awareness training in information security disciplines to energy sector companies, particularly in the area of information assurance (information systems security). The information security program provides matrix support to various Departmental programs, such as the critical infrastructure program and the counterterrorism/counterintelligence programs.

- **Security Education Briefing and Awareness** provides support for Security Education Briefing and Awareness to reflect changing policies and procedures. Coordinates and participates in security

education workshops and meetings for the exchange of resources and dissemination of security education information and assists contractors in establishing supporting briefing materials.

- **Personnel Security** evaluates, reviews, and develops guidance and documents for use in evaluating the Personnel Security Assurance Program (PSAP) as it relates to medical, psychological, legal, security, and management components. Researches and prepares technical documents to support the Personnel Security activities. Provides technical assistance and operational support to the Personnel Security program manager to determine current status of science and technology in the component areas.

- **Additional Support** provides Headquarters and field elements with support to implement cost-saving safeguards and security measures. This support includes technical assessments, risk management/ vulnerability assessment expertise, engineering assistance, surveys, and performance testing. Enhancements to the DOE safeguards and security risk management process were necessary in FY 1998 to address changes in Departmental priorities, changes in technology, and increased emphasis on the application of appropriate technologies. FY 1999 will continue the established program as a phased process within the Department. FY 2000 activities and funding levels are formulated to incorporate enhanced risk management tools currently under development and to assist/train all Departmental elements in their correct use. Additional Support also provides for technical background on policy issues, administrative and technical guidance in the development of computer security policy for systems possessing national security interest data (unclassified and classified), and the security alarm system at Headquarters.

  The Safeguards and Security Information Management System (SSIMS) tracks and reports classified safeguards and security issues from all DOE field sites. SSIMS allows OSS to conduct continuous reviews of the security measures in place at DOE/contractor facilities, ensuring compliance with DOE policy requirements and monitoring the effectiveness of Departmental policy involving the protection of national security assets. SSIMS funding will maintain a database information system detailing facility findings, ratings, and general operational status; assist in technical performance review of system software; provide training support for data base users and document and course material update; provide additional system and development support; and computer software and hardware, including minor upgrades to existing system.

  The Headquarters Guard Contract provides security for the protection of Government property, classified matter, and personnel at headquarters buildings.

- **Critical Infrastructure Protection Program** will carry out the national mandates of the Critical Infrastructure Protection directive and Presidential Decision Directive 63 regarding critical infrastructure protection. These mandates obligate DOE to partner with the private sector in ensuring the viability of the energy sector infrastructures nationwide. In addition to responsibilities for its own critical infrastructure, the Department is primarily responsible for ensuring that the DOE national laboratories' capabilities are fully utilized in regards to developing flexible, evolutionary approaches that span both public and private sectors, and protect both domestic and international security.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nonproliferation and National Security Institute (NNSI)	7,813	7,813	8,813	+1,000	+12.8%
Information Security	2,770	3,814	6,464	+2,650	+69.5%
Security Education Briefing and Awareness	181	181	181	0	0
Personnel Security	485	485	485	0	0
Additional Support					
Headquarters Guard Contract	7,000	7,000	7,654	+654	+9.3%
Other	3,481	9,437	3,937	-5,500	-58.3%
Total Additional Support	10,481	16,437	11,591	-4,846	-29.5%
Critical Infrastructure Protection Program	0	0	2,100	+2,100	+100.0%
Total, Operational Support	21,730	28,730	29,634	+904	+3.1%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Nonproliferation and National Security Institute			
■ Conduct approximately 148 courses with 176 classroom iterations, emphasizing "Online Training." Funding increase in FY 2000 allows the development of approximately 30 new courses to meet identified field site training needs for chemical/biological equipment, response to weapons of mass destruction, and advanced physical security systems. Funding will also reduce accumulated, deferred infrastructure maintenance/replacement backlog by 25%, including such things as required fire alarms, mandatory "Americans with Disability Act" (ADA) upgrades, lighting, and required fire sprinklers.	7,750	7,750	8,750
■ Provides funding to support NNSI's equipment-related needs such as replacement of outdated interactive television technology equipment	63	63	63
Total, Nonproliferation and National Security Institute	7,813	7,813	8,813

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Information Security			
■ The Information Security Resource Center (ISRC) in FY 2000 continues to provide technical expertise, assistance, training, and awareness in an integrated manner across the five disciplines of information security. Activities support the identification, investigation, and resolution of security problems across the department, especially in the area of unauthorized disclosures and compromises of classified information; analysis of incidents and facility survey information to identify problems within the information security program; and analysis of foreign ownership, control or influence (FOCI) in determinations of contracts within the various program elements of DOE dealing in classified information. Increase in funding is based on the continuing, increasing trend of unauthorized disclosures or compromises of classified information throughout DOE and the increasing complexity of FOCI issues.	1,152	1,152	1,602
■ The Information Assurance Outreach Program (IAOP) in FY 2000 continues to provide technical advice and awareness to energy sector elements in support of the Presidential Decision Directive (PDD 63) on Critical Infrastructure Protection. The IAOP provides unbiased capability to energy sector companies in the areas of information assurance including vulnerability testing, design reviews, independent verification and validation of information system security measures, and awareness of emerging information assurance issues. IAOP activities provide basic level of assurance that key energy sector assets are protected in a reasonable manner that ensures that national and economic security concerns of the country are not adversely affected by terrorist activities. Funding levels are based on industry requests for support activities and ensures support is provided to systems and areas that would have a high impact on national and economic security missions.	1,500	1,500	1,450

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The Information Assurance Program provides continuation of the accelerated development and deployment of capabilities within the information systems security (information assurance program) in FY 2000, supporting various departmental programs and missions including counterintelligence, counterterrorism, and internal critical infrastructure protection. Activities include expansion of information assurance forensics analysis capabilities to support investigations and prosecutions of unauthorized disclosures of classified information, unauthorized intrusions into departmental networks, and providing input into the information systems security technology development program to develop new technology in response to new network intrusion methods. Activities also include developing and verifying unique, trusted solutions to the next generation of departmental specialty networks such as the control systems for the National Ignition Facility (NIF) and the Accelerated Strategic Computing Initiative (ASCI); and enhancements to commercially available information systems security products to ensure classified information is appropriately protected from unauthorized access or disclosure. Funding levels have been determined based on the rate of technological advances and, in the case of forensics, based on similar activities within the Department of Defense. . . .	0	1,000	2,000
■ Reflects a transfer of activities for implementation of the Information Systems Security Program (Information Assurance) in FY 2000 which were previously developed under the Technology Development program. These elements include Baseline Skills Evaluation and Certification (training and education), the Computer Incident Advisory Capability (CIAC), the internal Advice and Assessment Program, and the operation of the DOE Information Systems Security Server. This funding level provides the basic architecture and baseline support in the effective implementation of the classified information systems security program throughout DOE. Funding levels were derived based on past activity levels.	0	0	1,250

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Provides for continuation of on-site technical support for information security in the areas of technical reviews of technology transfer issues and the conduct of inquiries into unauthorized disclosures of classified information, emphasizing computer forensics	118	162	162
Total, Information Security	2,770	3,814	6,464
Security Education Briefing and Awareness			
■ Provide security awareness throughout the DOE complex through education programs			
■ Support security awareness and education through information exchange by planning and conducting a Security Education Special Interest Group (SE/SIG) workshop			
■ Maintain the SE/SIG electronic bulletin board	181	181	181
Personnel Security			
■ Operate Center for Human Reliability Studies			
■ Support personnel security activities through guidance and product development, update and revise personnel security materials			
■ Serve as technical liaison with Department of Defense (DOD) Personnel Security Research Center, DOD Polygraph Institute and similar agencies and institutions			
■ Upgrade and maintain Personnel Security Assurance Program (PSAP) electronic bulletin board; evaluate and modify PSAP training materials	485	485	485
Additional Support			
■ Headquarters Guard Contract - Ensure a sound protection program is offered to Headquarters employees and facilities through use of 41 static posts and roving patrols, 16 supervisors, 4 managers, and 13 instructors, receptionists and administrative assistants. FY 2000 increase is required to cover normal escalation and inflation along with marginal flexibility in adjusting to technological changes and a follow-on contract	7,000	7,000	7,654
■ Support operational, maintenance, and enhancement costs for SSIMS	300	300	300

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Provides for installation and maintenance of residential alarm systems for senior level DOE management, and support and corrective/preventative maintenance of alarm systems and metal detectors at both headquarters facilities. Provides for engineering support, minor enhancements, and modifications to the headquarters access control systems. Increased funding in FY 2000 is for maintenance of new alarm system and vehicle barrier systems whose installation began in FY 1999 in response to eliminating/mitigating vulnerabilities identified in the Department of Justice Report on "Vulnerability Assessment of Federal Facilities."	753	753	883
■ Support the headquarters protective force radio system maintenance at the 90% operational level. Increased funding is due to past shared funding effort of system with Office of Human Resources and Administration which will now be sole responsibility of the Office of Safeguards and Security.	50	50	85
■ Perform physical security system reviews. In FY 2000, additional field evaluations are necessary to support enhanced vulnerability assessment process.	676	654	821
■ Provide risk management/vulnerability assessment program verifications and validation. In FY 2000, additional field evaluations are necessary to support enhanced vulnerability assessment process.	819	797	965
■ Assist in the development of DOE Orders and program policies on security requirements; develop database of electronic security systems components that will help users identify and manage system component lifecycle replacement issues; provide technical support in reviewing and validating assessment of security system requirements at DOE sites; supports expertise required for development of explosive detection support procedures; and provides for development of training course outlines for security system implementation and development of a certification process for security systems for determining how certified systems are meeting user needs versus their protection requirements.	387	387	387

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ In FY 1999, provided for the procurement and replacement of security locks meeting Federal Specification FF-L-2740A for containers holding sensitive classified material	0	1,000	0
■ Supports capitalized computer equipment requirements and modification and/or replacement parts to the Headquarters alarm and access control system. In FY 1999 work was initiated to begin alarm system replacement and installation of vehicle barrier systems at Headquarters for compliance with the Department of Justice Report on "Vulnerability Assessment of Federal Facilities."	496	5,496	496
Total, Additional Support	10,481	16,437	11,591
Critical Infrastructure Protection Program (CIPP)			
■ Provides expert technical assistance to the Energy Sector Coordinator in establishing collaborative working relationships between the government and the energy industry, facilitates development of information collection and sharing, and assists in the validation of industry-led vulnerability analyses	0	0	1,500
■ Supports implementation of a vulnerability assessment capability and a CIPP implementation tracking system	0	0	600
Total, Critical Infrastructure Protection Program	0	0	2,100
Total, Operational Support	21,730	28,730	29,634

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($ 000)
Nonproliferation and National Security Institute	
■ Nonproliferation and National Security Institute increase supports the development of 30 new courses meeting identified training needs for chemical/biological equipment, response to weapons of mass destruction, and advanced physical security systems and maintenance or replacement upgrades of existing infrastructure	+1,000
Information Security	
■ The Information Security Resource Center has increased emphasis in support of activities that identify and resolve security problems, particularly unauthorized disclosures and compromises of classified information and those associated with foreign ownership, control, and influence determinations	+450
■ Small decrease to the Information Assurance Outreach Program based on reduced industry requests for support activities	-50
■ Information Assurance Program provides for continuation of accelerated development and deployment of capabilities within the information systems security, supporting various departmental programs including counterintelligence, counterterrorism, and internal protection	+1,000
■ Reflects a transfer of activities that were developed under the Technology and Systems Development program to an implementation effort for the classified information systems security program throughout the Department	+1,250
Additional Support	
■ Headquarters Guard Contract provides for escalation associated with a follow-on contract	+654
■ Increased costs for maintenance of new alarm system and vehicle barrier systems in response to report on "Vulnerability Assessment of Federal Facilities"	+130
■ Reflects shift of shared funding responsibility totally to the Office of Safeguards and Security for maintenance of the Headquarters protective force radio system	+35
■ Supports requirement for additional field evaluations and physical security system reviews for enhanced vulnerability assessment process	+335
■ Reflects reduction for the FY 1999 funding for procurement of security locks that meet Federal Specification FF-L-2740A	-1,000
■ Reflects reduction to Headquarters facility upgrades. This upgrade was an FY 1999 activity that should be completed by year end	-5,000
Critical Infrastructure Protection Program (CIPP)	
■ Provides technical assistance to the Energy Sector Coordinator in establishing collaborative working relationships between the government and the energy sector	+1,500

	FY 2000 vs. FY 1999 ($ 000)
■ Supports implementation of a vulnerability assessment capability and a CIPP implementation tracking system	+600
Total Funding Change, Operational Support	+904

Technology and Systems Development

Mission Supporting Goals and Objectives

The Technology and Systems Development program's mission is to develop new technologies or modify commercial systems to protect the National nuclear complex, special nuclear materials, classified information and other critical assets. The threats facing DOE facilities and sites continue to evolve and present many challenges to the Department. Traditionally, the Technology and Systems Development Program was concerned with nuclear material control and accounting, but now is faced with other threats including weapons of mass destruction, terrorism, cyber attacks and the insider. Although the Department is no longer in a production mode, it is disassembling nuclear weapons and has received weapons grade materials from other countries. All of these weapons grade components and materials have resulted in increased nuclear material inventories which the Department must properly protect and account for. Technology continues to be the key to protect and secure the Department's facilities and assets. Safeguards and Security deficiencies requiring technical solutions have been identified and validated from safeguards and security managers around the DOE complex. Currently, the Domestic Safeguards and Security program can partially address approximately 50% of its domestic requirements. The program continues to provide technical solutions to meet our customers' needs. A few past accomplishments include the Enclosed Space Detection System to detect persons hidden inside vehicles; an Integrated Physical Security System (ARGUS); a Network Intrusion Detector that is implemented not only throughout the DOE, but DOD as well to detect unauthorized access to computer networks; and nondestructive assay systems that accurately quantify nuclear materials without exposing personnel to radiation. The program will continue to strive to sustain and utilize core security technologies and expertise, but also provide technical defenses against chemical and biological terrorism, cyber attacks, large bombs, and other contraband.

The Technology and Systems Development program is divided into the following subprograms:

Science and Technology Development Projects includes all activities ranging from basic research to full scale development and activities necessary to modify a proved technology for safeguards and security applications.

Technology Application includes site implementation of a technology or system that will address a safeguards and security deficiency and technology transfer to a qualified manufacturer.

Technology Support, Assistance, and Consultation Tasks includes technical training, technical support to Headquarters, technical workshops and seminars, and technical support and assistance to the DOE complex.

Each subprogram is concentrated in the following disciplines:

Physical Security: Activities are focused in detection, access control, alarm control and display, alarm assessment, adversary barriers/delay, and protective force subsystems.

Material Control and Accounting: Efforts are focuses in nuclear material measurements, material accounting, material control, training, and statistical methods.

Information Security: Projects are focused on advice and assessment, education and awareness, incident response, detection tools, technical assistance, and system integration, and information assurance.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Science and Technology Development Projects	17,975	19,877	24,154	+4,277	+21.5%
Technology Application	2,523	1,417	1,066	-351	-24.8%
Technology Support, Assistance, and Consultation Tasks	3,122	3,326	2,250	-1,076	-32.4%
Total, Technology and Systems Development	23,620	24,620	27,470	+2,850	+11.6%
Crosswalk of Disciplines					
Physical Security	7,419	9,318	11,128	+1,810	+19.4%
Material Control and Accountability	10,296	9,796	10,072	+276	+3.8%
Information Security	5,905	5,506	6,270	+764	+13.9%
Total	23,620	24,620	27,470	+2,850	+11.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Physical Security			
■ Correct vulnerabilities at DOE sites to protect DOE sites and assets from outside attacks, such as terrorists, and also from insider collaboration. In FY 2000, funds have been increased in this area to develop solutions to address the evolving threats that the Department faces. (SNLA, LLNL, Remote Sensing Lab/NV, and OR/LMES)	3,976	4,735	5,420
■ Provide required upgrades to the Department's standardized integrated access control system. These upgrades include replacing the obsolete database interface and software, as well as testing the system against new DOE performance requirements (LLNL)	300	950	1,450
■ Explosives Detection. Evaluate commercial explosives detection systems to determine applicability to the Department. FY 2000 will focus on developing a low cost capability to detect explosives hidden in vehicles. (SNLA)	530	680	980
■ Test and evaluate physical security equipment to characterize their performance and determine their applicability to DOE sites. (SNLA)	1,205	1,365	1,340
■ Prevent/delay attacks to DOE sites by developing robust barriers that resist known penetration attacks. Current barriers have proven to be inadequate. Increase in funding supports additional efforts focused on testing and implementing effective barriers to decrease potential vulnerabilities to the DOE complex. (SNLA)	470	450	650
■ Develop tools to assess the Department's risk to chemical and biological weapons. Increased funding allows the evaluation of detectors to determine their best configuration for application to DOE sites to provide early detection of a possible terrorist attack. (SNLA)	400	500	750
■ Develop tools to simulate DOE sites and perform risk analyses to determine the optimum security needs within current constraints. (SNLA)	150	250	150
■ Capital Equipment	388	388	388
Total, Physical Security	7,419	9,318	11,128

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Material Control and Accounting (MC&A)			
■ Extend measurement capabilities to account for 100% of the DOE's special nuclear materials inventory. i.e., scrap and residues. (LANL, LLNL)	6,472	4,427	4,542
■ Provide contraband detection technologies to detect materials hidden or shielded within packages or vehicles. (LANL)	500	650	350
■ Evaluate commercial MC&A systems and technologies to determine their applicability to DOE. (LANL)	250	460	535
■ Develop special nuclear material standards to calibrate instruments. Efforts are reduced due to completion of a set of standards. (LANL)	250	800	650
■ Provide required modules to the Department's standard material control and accounting system. Increase permits system to be integrated into other safeguards and security systems. (SRS)	800	800	1,200
■ Develop DOE courses to keep personnel abreast of latest MC&A technologies and issues impacting the DOE complex. (LANL)	850	855	900
■ Provide technical assistance and maintenance to DOE sites for fielded MC&A systems. (LANL, LLNL, & Science & Tech Lab/NV)	810	1,440	1,531
■ Capital Equipment	364	364	364
Total, Material Control and Accounting	10,296	9,796	10,072
Information Security			
■ Complete Phase II of Automated Information Systems Alarms Project (LANL, Science & Tech Lab/NV, LLNL)	2,325	2,325	2,325
■ Develop advanced tools and technologies to detect/prevent penetrations to computer networks. Increased funds will be used to provide advanced tools to respond to the dynamic threats facing computer system networks. (LLNL, LANL)	2,745	2,321	3,085
■ Provide technical assistance on current threats to DOE information networks and determine mitigation strategies. (LLNL)	450	450	450
■ Provide low cost experience-based training for network system administrators. (LLNL)	200	225	225
■ Capital Equipment	185	185	185

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Total, Information Security	5,905	5,506	6,270
Total, Technology and Systems Development	23,620	24,620	27,470

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($ 000)
Science and Technology Development Projects	
■ The increase provides for additional support to physical security (+1,810) to correct vulnerabilities at DOE sites by developing solutions to address evolving threats from terrorist and insider collaboration, provide required upgrades to DOE's standardized integrated access control system, develop robust barriers to better resist penetration attacks and evaluate technologies to protect DOE facilities and personnel from chemical and biological weapons. In MC&A, additional efforts will focus on advanced measurement technologies (+$276) and developing additional modules for the Department's standardized material control and accounting system (+$375). Activities will also be accelerated to ensure the integrity of classified computer systems within the Department (+$1,052) including the development of advanced computer security tools (+$764)	+4,277
Technology Application	
■ Efforts to assist sites with implementation of material control and accounting technologies will be completed and activities will shift to developing technical solution to address vulnerabilities	-351
Technology Support, Assistance, and Consultation Tasks	
■ Efforts will be redirected from providing technical support to Headquarters on MC&A, computer security, and physical security issues to developing solutions to correct deficiencies at DOE sites	-1,076
Total Funding Change, Technology and Systems Development	+2,850

Classification/Declassification

Mission Supporting Goals and Objectives

The majority of the Classification/Declassification program is now funded in the Nonproliferation and National Security Program Direction budget. The portion of the Classification/Declassification program funded here is primarily provided by Management and Operating contractors in the field in support of the ongoing base program as well as support of the declassification initiative. The ongoing base classification program includes the routine review and development of classification guidance. The declassification initiative program includes development and utilization of advanced technologies to improve the efficiency and productivity of the document declassification review process. Also, included in the declassification initiative is the development of specific guidance to implement approved Fundamental Classification Policy Review recommendations, while undertaking a restructuring and streamlining of the entire classification guide system, ultimately improving classification and declassification efficiency. These efforts under the Classification/Declassification program will maximize public access to the Department's information, consistent with nonproliferation and national security objectives.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Classification/Declassification	1,850	1,850	1,996	+146	+7.9%
Total, Classification/Declassification	1,850	1,850	1,996	+146	+7.9%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Classification/Declassification			
Development of state-of-the-art technology for document declassification to improve efficiency and effectiveness of declassification			
■ Test and evaluate prototype declassification technology in FY 1998	775	0	0
■ Limited expansion of electronic document declassification system and testing the application of the declassification tools against a set of documents in FY 1999	0	625	0
■ Set up test capability at one field location in FY 2000	0	0	771
Development of guidance to implement Fundamental Classification Policy Review (FCPR) recommendations under streamlined system, improving overall effectiveness of the classification guidance system			
■ Continue effort to develop specific classification guidance implementing FCPR using page change method through mid-FY 1999	1,075	612	0
■ In late FY 1999, transition into classification guidance streamlining method to implement FCPR. In FY 2000 continue classification guidance streamlining, issuing in the streamlined format 40 guides containing updated guidance	0	613	1,225
Total, Classification/Declassification	1,850	1,850	1,996

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($ 000)
■ Allows for testing the application of declassification tools at one field location ...	+146
Total Funding Change, Classification/Declassification	+146

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	1,496	6,496	1,496	-5,000	-77%
Total, Capital Equipment	1,496	6,496	1,496	-5,000	-77%

Security Investigations

Program Mission

The Security Investigations Program funds background investigations for all DOE federal staff and all Headquarters contractors, who, in the performance of their official duties, require access authorizations for Restricted Data, National Security Information, or special nuclear material. User programs will fund field office requests for background investigations for contractors and non-federal employees who are not included in the Security Investigations Program budget.

Program Goal

Support the common defense and security of the United States by ensuring that only appropriate personnel are authorized access to classified information, special nuclear material, or occupy sensitive positions.

Program Objectives

- Ensure the timely and efficient processing and adjudication of initial access authorization requests and reinvestigations.
- Reduce the types and numbers of access authorizations, consistent with DOE mission changes, the downsizing of the nuclear weapons complex, and other classified programs and activities.
- Support development and implementation of an electronic network among DOE field offices, DOE contractors, the Office of Personnel Management (OPM) and other Federal agencies to reduce the overall access authorization processing time.

Performance Measures

- Conduct approximately 17,379 personnel security investigations and reinvestigations for the total DOE-wide program.
- Reduce the numbers and levels of access authorizations as the programmatic need for them diminishes.

Significant Accomplishments and Program Shifts

The FY 1998 appropriation for this program was $30 million - paid through a single decision unit: Security Investigations.

In order to encourage further reductions in the number of security clearances, the cost of investigations requested by the field offices for all contractors and non-federal employees will be allocated to four user

programs. The cost of investigations for all federal employees (DOE-wide) and Headquarters requirements will continue to be allocated to the Security Investigations Program.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Security Investigations					
Security Investigations	30,000	30,000	0	30,000	30,000
Off-sets from Program Organizations	0	-20,000	0	-20,000[a]	-20,000
Total, Security Investigations	30,000	10,000	0	10,000	10,000

Public Law Authorization:
Public Law 83-703, "Atomic Energy Act of 1954"

[a]The Controller's Office notified the Congress that the Department may allocate up to $35 Million from Program Organizations to fund security investigations. It is not known at this time what will actually be spent by each program.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	13,195	9,013	8,429	-584	-6.5%
Chicago Operations Office	365	409	246	-163	-39.9%
Idaho Operations Office	384	498	476	-22	-4.4%
Nevada Operations Office	1,275	506	564	+58	+11.5%
Oak Ridge Operations Office					
Oak Ridge Operations Office	2,000	3,083	2,993	-90	-2.9%
Oak Ridge Institute of Sci. & Ed.	250	300	300	0	0.0%
Total, Oak Ridge Operations Office	2,250	3,383	3,293	-90	-2.7%
Pittsburgh Naval Reactors Office	1,000	1,002	1,234	+232	+23.2%
Richland Operations Office	671	826	725	-101	-12.2%
Oakland Operations Office	3,750	2,386	2,885	+499	+20.9%
Savannah River Operations Office	1,300	2,241	2,387	+146	+6.5%
Schenectady Naval Reactors Office	421	436	461	+25	+5.7%
Washington Headquarters	5,389	9,300	9,300	0	0.0%
Subtotal, Security Investigations	30,000	30,000	30,000	0	0.0%
Off-sets from Program Organizations	0	-20,000[a]	-20,000	0	0.0%
Total, Security Investigations	30,000	10,000	10,000	0	0.0%

[a]The Controller's Office notified the Congress that the Department may allocate up to $35 Million from Program Organizations to fund security investigations. It is not known at this time what will actually be spent by each program.

Site Description

Oak Ridge Institute of Science and Education

The Oak Ridge Institute for Science and Education (ORISE) located in Oak Ridge, Tennessee, carries out national and international programs in science and engineering education, training, and management systems, energy and environment systems, and medical sciences. ORISE conducts these programs for the U.S. Department of Energy through a management and operating contract with Oak Ridge Associated Universities (ORAU). Established in 1946, ORAU is a not-for-profit consortium of 62 colleges and universities. ORISE supports the personnel security research and analysis activities of the Office of Safeguards and Security. They provide DOE with technical support for implementation, training, operation, and quality assurance of the personnel security process, and a variety of research and analysis activities in support of personnel security function. They also develop and distribute briefing materials as required by the refresher briefing provisions in DOE O 470.1, Chapter 4, "Safeguards and Security Awareness Program. Materials are delivered to all DOE and DOE contractor sites required to provide refresher briefings to employees.

Security Investigations

Mission Supporting Goals and Objectives

The Security Investigations Program funds background investigations for DOE federal staff and Headquarters contractors who, in the performance of their official duties, require access authorizations for Restricted Data, National Security Information, or special nuclear material. Security Investigations are required in order to be in compliance with Section 145 of the Atomic Energy Act of 1954, as amended, Title 10, Code of Federal Regulations, Part 710, and Executive Order 12968, which mandate that access authorizations (security clearances) are required for access to classified information or special nuclear material. The Department utilizes the services of the Office of Personnel Management (OPM) to conduct security investigations which serve as the basis for these access authorizations. The cost of security investigations is set by OPM depending on the type and level of investigation needed.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Federal Bureau of Investigations Background Investigations	49	49	66	+17	+34.7%
Office of Personnel Management					
Initial Background Investigations	4,989	4,940	9,926	+4,986	+100.9%
Reinvestigations	21,726	21,666	16,454	-5,212	-24.1%
National Agency Checks	576	635	444	-191	-30.1%
Total, Office of Personnel Management	27,291	27,241	26,824	-417	-1.5%
Related Security Investigations Activities	2,660	2,710	3,110	+400	+14.8%
Subtotal, Security Investigations	30,000	30,000	30,000	0	0.0%
Off-sets from Program Organizations	0	-20,000*	-20,000	0	0.0%
Total, Security Investigations	30,000	10,000	10,000	0	0.0%

*The Controller's Office notified the Congress that the Department may allocate up to $35 Million from Program Organizations to fund security investigations. It is not known at this time what will actually be spent by each program.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Federal Bureau of Investigations (FBI)			
■ Conduct up to 12 initial FBI background investigations and reimburse the FBI for fingerprint cards and name checks. This represents an increase of 3 cases over FY 1998 and FY 1999 estimates, and allows for gradual cost increases for fingerprint cards and name checks	49	49	66
Office of Personnel Management			
■ Anticipate 3,214 OPM initial (Single Scope Background) investigations in FY 2000. Increase is necessary to meet field office requirements such as the accelerated closure plan at Rocky Flats Environmental Technology Site, accelerated cleanup efforts at Oak Ridge's K-25, Y-12 and Oak Ridge National Laboratory, and the removal of spent fuel in the 100K Basins at Richland. The 1,607 cases projected in FY 1999 and 1,623 cases funded in FY 1998 have proven inadequate to meet program requirements due to developing programs, accelerated cleanup efforts, and an increase in the number of "L" initial upgrades from National Agency Checks to full-field background investigations based on derogatory information uncovered in the initial review of security forms	4,989	4,940	9,926
■ Perform 10,300 OPM periodic reinvestigations (for Single Scope Background Investigations) in FY 2000. Project 13,800 cases in FY 1999 and conducted 13,848 cases in FY 1998	21,726	21,666	16,454
■ Conduct 3,865 National Agency Checks (NAC's) in FY 2000. Plan to support 5,518 NAC's in FY 1999 and 5,013 NAC's in FY 1998	576	635	444
Total, Office of Personnel Management	27,291	27,241	26,824
Related Security Investigations Activities			
■ Continue operation and maintenance of the Electronic Transfer Program throughout DOE	2,000	2,000	2,400
■ Continue to support Accelerated Access Authorization Program (AAAP)	400	400	400

■ Provide support for miscellaneous costs involved in maintaining a viable personnel security program	260	310	310
Total, Related Security Investigations Activities	2,660	2,710	3,110
Subtotal, Security Investigations	30,000	30,000	30,000
Off-sets from Program Organizations	0	-20,000[a]	-20,000
Total, Security Investigations	10,000	10,000	10,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Federal Bureau of Investigations (FBI)	
■ Federal Bureau of Investigations funding level reflects price increases for provided services	+17
Office of Personnel Management	
■ Initial Office of Personnel Management (OPM) background investigation estimates are based on specific site and contractor needs. Increase is necessary to meet field office requirements, such as the accelerated closure plan at Rocky Flats Environmental Technology Site, accelerated cleanup efforts at Oak Ridge's K-25, Y-12, and Oak Ridge National Laboratory, and the removal of spent fuel in the 100K Basins at Richland	+4,986
■ OPM reinvestigation activities have been reduced in order to meet increased initial investigation requirements. A $20 million off-set from program organizations would be inadequate and additional backlogs could be anticipated	-5,212
■ National Agency Checks are now budgeted for initial "L" clearances only. Changes in the Executive Order 12968 Investigative Standards have revised the reinvestigation requirements for "L" clearances from 5 years to 10 years	-191
Related Security Investigations Activities	
■ Enhance the Electronic Transfer Program to support additional functionality and security features	+400
Total, Security Investigations	0

[a]The Controller's Office notified the Congress that the Department may allocate up to $35 Million from Program Organizations to fund security investigations. It is not known at this time what will actually be spent by each program.

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Emergency Management

Program Mission

The Office of Emergency Management serves as the point of contact and control for all Departmental emergency management and threat assessment related activities and ensures an integrated response to emergencies affecting Departmental operations and activities or requiring Departmental assistance. The principal mission of the Office is to provide comprehensive, integrated emergency planning, preparedness, and response programs throughout the Department and to provide threat assessment support to the Department's Headquarter and field operations. The Office operates the Headquarters Emergency Operations Center, Communications Center and the Department's emergency communications network; develops and operates reliable capabilities to detect and assess developing emergency situations and threats; provides rapid credibility assessment of nuclear threats and potential smuggling activities; responds to emergencies; and issues all policy and guidance for the Department's emergency programs. This program also operates the HAZMAT Spill Center, which supports the formulation of emergency management policy for hazardous materials and conducts research in partnership with government and industry.

Program Goal

Support the National Security of the United States by ensuring an integrated Departmental response to all emergencies and assessing the credibility of threats and smuggling activities.

Program Objectives

- Maintain national security and ensure protection of workers, the public, and environment.
- Execute an integrated Departmental program in support of other U.S. Government agencies for combating terrorism and supporting crisis and consequence management to any terrorist act.
- Maintain the capability to provide technical advice and assistance to Departmental elements for cost effective implementation of emergency management programs.
- Develop, maintain, and promulgate policy; planning and preparedness guidance; and readiness assurance activities.

- Assess threats to DOE personnel, operations, and facilities from foreign and domestic adversaries and provide timely reports.
- Assess the credibility of nuclear threats received worldwide as well as support efforts for the prevention of illicit nuclear materials trafficking.
- Operate and maintain the Headquarters Emergency Operations Center, Communications Center and the Department's emergency communications network.
- Provide program management for operations of the HAZMAT Spill Center program.
- Maintain emergency programs to minimize adverse impacts on national security and public safety.
- Promote the Department's emergency policy interests in international fora.
- Support deployment and operational capabilities of nuclear and chemical dispersal models for emergency planning, preparedness and response to situations involving Departmental operations and activities.

Performance Measures

- Demonstrate improvement of a comprehensive management system to ensure effective Departmental response to all DOE emergencies.
- Maintain robust emergency response assets in accordance with Presidential Decision Directive 39, the Atomic Energy act, Executive Order 12656, and Federal Emergency Plans.
- Conduct twelve (12) emergency management system training and technical assistance conferences and workshops.
- Conduct three (3) technical threat awareness and two (2) weapons of mass destruction training courses.
- Conduct six (6) emergency management system technical assistance visits.
- Conduct four (4) evaluations of Department-wide drills and exercises.
- Conduct four (4) appraisals of Departmental emergency programs.
- Conduct thirty five (35) weeks of testing at the HAZMAT Spill Center.

- Provide situation assessments within one (1) hour after identification of a potential emergency.
- Support the increased role and visibility of the Department as a leader in the formulation of National Security related policies for combating terrorism and nuclear materials trafficking.
- Conduct thirty (30) threat assessments.

Significant Accomplishments And Program Shifts

Planning and Preparedness

- Conducted emergency management system appraisals and evaluated Department-wide drills and exercises.
- Increased customer involvement in planning, preparedness, and readiness assurance activities.
- Improved collaborative efforts with Federal, state, tribal and industry entities to prepare for and respond to emergencies involving Departmental operations and activities.
- Continued expansion of the Headquarters emergency operations center voice, data, and video connection to include additional DOE sites and other Federal agencies.

Training and Outreach

- Improved operation of DOE's emergency management system and emergency facilities through technical assistance, and enhanced training and assistance workshops.
- Provided training to the Counter Terrorism Community on national security activities involving weapons of mass destruction.
- Conducted Threat Awareness seminars for DOE, industry, law enforcement, and Intelligence Community.

Response

- Provided situation reports and assessments for developing emergencies.
- Provided assessments of threats to DOE facilities and interests and collaborated with the FBI's National Center for the Analysis of Violent Crime for joint information and data sharing.

- Provided rapid credibility assessment of any nuclear threats involving nuclear weapons, devices or materials, and supported rapid credibility assessment of potential nuclear weapons or materials smuggling activities.

- Provided, through the Atmospheric Release Advisory Capability Program, plume modeling and dispersion for radioactive material and chemical agent releases to the atmosphere.

Counterterrorism

- Provided an annual report on illicit nuclear material transactions.

- Improved support to other U.S. Government agencies in combating nuclear terrorism and providing crisis and consequence management to any terrorist act.

- Continued leadership role of the Department in the formulation of national security related policies for nuclear materials trafficking.

- Built upon and leveraged extensive DOE capabilities and assets to ensure effective emergency response to counter terrorism.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Emergency Management					
Operating Expenses.....	20,000	21,000	0	21,000	21,000
Total, Emergency Management....	20,000	21,000	0	21,000	21,000

Public Law Authorization:
P. L. 83-703, "Atomic Energy Act of 1954"
P. L. 103-62, "Government Performance Results Act of 1993"

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$Change	%Change
Operation of HAZMAT Spill Center.....	1,500	1,500	1,500	0	0%
Total, Capital Operating Expenses.....	1,500	1,500	1,500	0	0%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Brookhaven National Laboratory	250	300	300	0	0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	850	950	950	0	0%
Idaho Operations Office					
Idaho National Engineering Laboratory	50	0	0	0	0%
Albuquerque Operations Office					
Los Alamos National Laboratory	80	30	30	0	0%
Nevada Operations Office	9,040	9,500	9,500	0	0%
Richland Operations Office	50	50	50	0	0%
Pacific Northwest Laboratory	300	300	300	0	0%
Total, Richland Operations Office	350	350	350	0	0%
Oak Ridge Operations Office	2,320	2,500	2,500	0	0%
Washington Headquarters	7,060	7,370	7,370	0	0%
Total, Emergency Management	20,000	21,000	21,000	0	0%

Site Description

Brookhaven National Laboratory

Funding for technical support to the Subcommittee on Consequence Assessment and Protective Actions, which provides technical recommendations on emergency response to radiological and hazardous materials to protect health and safety of workers and the public.

Lawrence Livermore National Laboratory

Funding for nuclear forensics program to develop capability to determine origin of stolen/smuggled nuclear materials and for Atmospheric Release Advisory Capability which provides plume modeling for emergency events, a critical element for protection of workers and public.

Los Alamos National Laboratory

Supports the Emergency Operation Center system, connecting Operations Offices, laboratories, and relevant other Federal agencies by voice, video, and data to ensure cohesive and effective response to emergencies.

Nevada Operations Office

Funding for: threat assessment program, providing a national information resource and capability to assess the credibility of radiological and extortion threats; the HAZMAT Spill Center, a research and demonstration facility available on a user-fee basis to private and public sector test and training sponsors concerned with safety aspects of hazardous materials; and continuing emergency management activities including specialized training for DOE and stakeholders in subject areas such as weapons of mass destruction.

Richland Operations Office

Funding to conduct emergency management training activities to ensure comprehensive response to the spectrum of possible emergencies across the DOE complex.

Pacific Northwest Laboratory

Funding for SPIRE program (Spatial Paradigm for Information Retrieval and Exploration) to apply state-of-the-art analytical tools providing rapid understanding of large textual databases; and for emergency management assistance for technical reviews and appraisals of the Department's emergency management system.

Oak Ridge Operations Office

Funding for technical expert assistance for emergency management system appraisals and training development; for the behavioral assessment program to determine credibility of communicated threats; and for Emergency Management Issues Special Interest Group program, which provides up to date training and information to emergency managers from across DOE complex.

Washington Headquarters

Funding for Emergency Operations Center and Communications Center maintenance and support; support service contractor for Emergency Operations Center and Communications Center; and for maintenance and expansion of communications systems connecting DOE complex and selected other Federal agencies. The Emergency Operations Center and Communications Center are essential for Departmental response to emergencies that may occur at DOE facilities, elsewhere in the United States, and in foreign countries when assistance is requested.

Operating Expenses

Mission Supporting Goals and Objectives

The Office develops and implements specific programs, plans and systems to minimize the impact of emergencies on national security, worker and public safety, and the environment. The Office provides overall coordination and consultation regarding the Department's Emergency Management System, including emergency assistance and mobilization under the Federal Response Plan to radiological and non-radiological hazardous materials events, and in the event of malevolent threats and nuclear materials smuggling. The Office promulgates Departmental requirements and implementing guidance, and conducts readiness assurance activities to ensure an effective emergency management system is in place at Departmental facilities. The Office also coordinates inter-agency and intra-Departmental emergency planning, preparedness and exercises, and coordinates with state and local governments, international agencies, foreign governments, and industry on emergency planning, preparedness and exercise issues.

Another mission area is to identify and assess hostile threats to Departmental facilities, interests and personnel, assess the credibility of nuclear threats received world-wide, and support U.S. Government and allied nations efforts for the prevention of illicit nuclear materials trafficking worldwide. The Office operates and maintains the Headquarters 24-hour per day emergency operations facilities and 24-hour communications center for the collection and processing of information relative to emergency notifications. In addition, the Office is responsible for reporting and support of emergency management activities at the Headquarters level. The Office also implements a security program for the protection of Office information, equipment, and facilities.

To effectively implement its mission, the Office develops and maintains capabilities to efficiently integrate and coordinate a Departmental response to all emergencies. The Office provides liaison and coordination regarding operational emergency response activities, ensuring that the Department responds capably to possible emergency situations that may occur at DOE facilities, elsewhere in the United States, and in foreign countries when assistance is requested. Additionally, the HAZMAT Spill Center provides the DOE community, other governmental agencies, and private sector customers with a unique training, testing, and technical center for hazardous materials research relating to emergency management.

These activities are in support of the Atomic Energy Act of 1954, as amended, Presidential Decision Directives 39, 41, 62, 63, and 67, Executive Orders 12656 and 12919, the Defense Production Act of 1950 as amended, Presidential Review Directive 47, and environment related regulations including the Resource Conservation and Recovery Act, Superfund Amendments and Reauthorization Act of 1986, Comprehensive Environmental Response Compensation and Liability Act, and Clean Air Act Amendments of 1990.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	%Change
Emergency Management....	16,500	17,200	17,200	0	0%
Total, Operating Expenses.....	1,500	1,500	1,500	0	0%
Emergency Operations Support Service Contract.....	2,000	2,300	2,300	0	0%
	20,000	21,000	21,000	0	0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY1999	FY2000
Emergency Management			
■ Operate nation-wide voice, data, and video link-up of DOE Operations Offices and select National Laboratory emergency operation centers, and expand system to include additional laboratories, DOE sites, and selected Federal agencies. Operate the 24-hour Watch Office and Communications Center.	4,600	4,700	4,700

(dollars in thousands)

	FY 1998	FY1999	FY2000
■ Conduct planning, training and readiness assurance activities to ensure effective implementation of the Department's emergency management system. Provide emergency management, assessment, and threat awareness training, and assistance workshops to Departmental elements, Federal, state, local, and tribal governments, and international community. Develop new training to meet specific needs.	3,300	3,500	3,500
■ Conduct technical assistance visits to assist Departmental elements in determining program weaknesses and cost effective means for making improvements. Evaluate tests and exercises of Departmental programs to demonstrate effective emergency response. Write after-action reports with findings and recommendations for all emergency situations and exercises involving Office of Emergency Management Staff and ensure follow-up of appropriate corrective actions to enhance the emergency management system.	1,900	2,200	2,200
■ Respond to natural and man-made disasters to provide damage assessments and technical assistance to state and local governments and industry in restoration of essential energy services and consequence management. Assist in the preparation of State energy emergency plans and prepare situation reports on energy emergencies for senior Departmental officials.	1,100	0	0
■ Continue to operate the communicated threat assessment program to provide a national capability to assess the credibility of radiological and extortion threats. Continue to strengthen the analytical data base.	3,100	4,000	4,000

(dollars in thousands)

	FY 1998	FY1999	FY2000
■ Provide support to increase the role and visibility of the Department as a leader in the formulation of national security related policies for nuclear materials trafficking and enhance the nuclear materials trafficking hotline. In support of U.S. Government agencies, maintain data on the flow and composition of nuclear smuggling focusing on the quality of smuggled material, the source of the material, and the intended use of the smuggled material. Enhance operational capability for response to situations to obtain samples of intercepted materials.	700	900	900
■ Strengthen and expand the Department's support for crisis and consequence management in combating terrorism and nuclear material trafficking. Initiate a program in support of interagency and Departmental exercises to ensure adequate and comprehensive response to counter terrorism.	1,200	1,300	1,300
■ Expand and integrate the Atmospheric Release Advisory Capability (ARAC) plume modeling for chemical and hazardous materials releases involving Departmental activities.	600	600	600

	(dollars in thousands)		
	FY 1998	FY1999	FY2000
HAZMAT Spill Center			
■ Continue user-sponsored spill tests for both government and industry at the HAZMAT Spill Center; provide spill test results to Departmental elements, other government agencies, industry and the general public for use in hazards mitigation and emergency responder training programs	1,500	1,500	1,500
Emergency Operations Support Service Contract			
■ Staff the 24-hour Watch Office and Communications Center.	2,000	2,300	2,300
Total, Emergency Management	20,000	21,000	21,000

HEU Transparency Implementation

Program Mission

The Highly Enriched Uranium (HEU) Transparency Implementation program is responsible for ensuring that the nonproliferation aspects of the February 1993 agreement between the United States and the Russian Federation are met. This Agreement covers the purchase over 20 years of low enriched uranium (LEU) derived from at least 500 metric tons of HEU removed from dismantled Russian nuclear weapons. Under the Agreement, conversion of the HEU components into LEU is performed in Russian facilities. The purpose of the program is to put into place those measures agreed to by both sides, that permits the U.S. to have confidence that the Russian side is abiding by the Agreement.

Program Goal

- The goal of the HEU Transparency Implementation Program is to support the implementation of United States nonproliferation policy by providing confidence that Russian LEU sold to the United States Enrichment Corporation (USEC) is derived from HEU removed from dismantled Russian nuclear weapons.

Program Objectives

- Implement and support transparency monitoring activities in Russia and the United States at each country's uranium processing facilities subject to the Agreement.
- Collect and analyze monitoring and other information to determine overall confidence that the Russians are converting HEU from dismantled Russian nuclear weapons into LEU.
- Provide assistance in the development and negotiating of new transparency measures.

Performance Measures

- Monitor the dilution of 30 metric tons of HEU to LEU from dismantled Russian nuclear weapons for purchase by the USEC.
- Conduct 24 special monitoring inspections in Russian facilities and maintain permanent presence offices in Russia to have confidence that the LEU being purchased by USEC has been derived from HEU removed from dismantled Russian nuclear weapons.
- Maintain the UF6 flow and enrichment measurement nondestructive assay (NDA) systems at the blend points at two Russian HEU dilution facilities. Collect and analyze resultant information from both sites where such equipment will have been installed.

- In conjunction with interagency staff, compile and analyze collected data and information into an assessment of confidence of compliance with the nonproliferation objectives of the HEU agreement.

Significant Accomplishments and Program Shifts

Program Shifts

In October 1998, as part of the Office of International Nuclear Safety and Cooperation, the HEU Transparency Implementation Program was moved to the Office of Nonproliferation and National Security (NN). Additionally, the budget request for the Program was moved to Other Defense Activities for FY 2000. Previously, the Program had been funded as part of Uranium Programs. This document represents the first stand-alone funding request for the HEU Transparency Implementation Program.

Historical and Planned Accomplishments

HEU Transparency Implementation activities began in FY 1993 as a result of wording contained in the February 1993 bilateral HEU Purchase Agreement. Significant historical and planned accomplishments are provided below.

- Provided technical, logistical, and document preparation support for various bilateral negotiation meetings resulting in the bilateral signing of a Memorandum of Understanding on Transparency (1993), a Protocol on HEU Transparency Arrangements in Furtherance of the Memorandum of Understanding (1994), and 16 Annexes to the Protocol governing transparency monitoring activities in both Russia and the U.S. (1994-1997).

- Conducted six familiarization visits (1993-1997) to four Russian sites where HEU is stored and processed into LEU for delivery to the U.S.

- FY 1995 through FY 1997 conducted 10 special monitoring visits to three Russian sites. During FY 1998 conducted 13 special monitoring visits to four Russian sites. In FY 1999, plans are to conduct 24 special monitoring trips to four Russian sites. In FY 2000, plans are to conduct 24 special monitoring trips to four Russian sites.

- In August 1996, opened a permanent U.S. monitoring office in Novouralsk, Russia. The office has a staff of up to four U.S. technical experts. In FY 1999, plans are to include permanent presence staff as members of special monitoring visit teams. A permanent presence office will be maintained in Russia in FY 2000..

- FY 1995-FY 1997 developed non-intrusive NDA flow and enrichment monitoring equipment for use on process pipes in the three Russian blending facilities. During FY 1997 conducted five technical installation visits to two Russian blending facilities and installed the electronic control units at the blend points. FY 1997-FY 1998 fabricated the flow and enrichment measuring systems for the two facilities and prepared necessary documentation required to obtain a Russian license to allow the equipment to be installed in Russian facilities. During FY 1998, demonstrated at the Paducah

Gaseous Diffusion Plant that the monitoring equipment will work on pipes with 1.5 percent UF6 gas flow. Plans are to install the equipment in one Russian blending facility in FY 1998-FY 1999 and a second facility in FY 1999. Installation at a third facility will be delayed until after FY 2000 due to budget constraints.

- FY 1995 started data analysis activities to evaluate confidence that the Russians are abiding by the Agreement. During FY 1997 determined through data analysis that the contents of one container of Russian LEU shipped to USEC did not appear to be derived from Russian HEU. Subsequent discussions with the Russian Government during FY 1997 and FY 1998 led to the exclusion of this container from the HEU Purchase Agreement deliveries.

- FY 1998 developed a centralized data base and the formation of two assessment teams to evaluate confidence that the Russians are taking HEU from dismantled nuclear weapons and converting it into LEU. Actual accountability and material transfer documents from the Russian facilities are now available for evaluation in conjunction with first-hand monitoring data. In FY 1999 expand access to centralized data base to enhance analysis of data.

Funding Profile

(dollars in thousands)

	FY 1998 Appropriation	FY 1999 Appropriation	FY 2000 Request
HEU Transparency Implementation	0	0	15,750
Total, HEU Transparency Implementation	0	0	15,750

In FY 1998 and FY 1999, HEU Transparency Implementation activities were funded through Uranium Programs.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	0	0	800	800	>999
Sandia National Laboratories	0	0	880	880	>999
Total, Albuquerque Operations Office	0	0	1,680	1,680	>999
Chicago Operations Office					
Argonne National Lab	0	0	810	810	>999
Brookhaven National Laboratory	0	0	180	180	>999
New Brunswick Laboratory	0	0	610	610	>999
Total, Chicago Operations Office	0	0	1,600	1,600	>999
Nevada Operations Office					
Remote Sensing Laboratory	0	0	595	595	>999
Oakland Operations Office	0	0	1,000	1,000	>999
Lawrence Livermore National Laboratory	0	0	7,000	7,000	>999
Oak Ridge Operations Office	0	0	50	50	>999
Lockheed Martin Energy Systems	0	0	2,800	2,800	>999
Richland Operations Office					
Pacific Northwest National Laboratory	0	0	25	25	>999
Washington, D.C. Headquarters	0	0	1,000	1,000	>999
Total, HEU Transparency Implementation	0	0	15,750	15,750	>999

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) is one of DOE's largest research centers. It is also the nation's first national laboratory chartered in 1946. Argonne occupies two sites. The Illinois site is surrounded by forest preserve about 25 miles southwest of Chicago's Loop. Argonne West site occupies about 900 acres about 50 miles west of Idaho Falls in the Snake River Valley. Argonne also maintains offices in the Washington, D.C. metropolitan area. ANL provides the HEU Transparency Implementation program with technical experts to serve as monitors on trips to Russian facilities involved in the conversion of HEU into LEU; technical assistance in the coordination of monitoring activities in Russia; and, in data analysis and confidence assessment of information gathered from monitoring activities.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a DOE scientific research laboratory located on Long Island, New York. BNL provides the HEU Transparency Implementation program with personnel to serve as monitors on trips to Russian facilities involved in the conversion of HEU into LEU and technical personnel to assist in the analysis of information received from monitoring activities in Russia.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a DOE weapons laboratory located in Los Alamos, New Mexico. LANL provides the HEU Transparency Implementation program with non-intrusive nondestructive assay equipment for measuring the enrichment of uranium hexaflouride gas in pipes. This equipment is scheduled to be installed in one Russian HEU dilution facility at the end of FY 1998, a second facility in FY 1999, and a third facility after FY 2000 at the current FY 2000 funding level. The equipment once installed will provide continuous monitoring of the enrichment flowing through the pipes. This information will provide high confidence that the Russians are diluting HEU with low enriched uranium to produce reactor grade LEU for shipment to the United States. LANL personnel are also used to prepare technical manuals related to the assembly, operation, and maintenance of the enrichment measurement equipment; training of both Russian and U.S. personnel on the installation, operation and maintenance of the equipment; and, assistance in installing the equipment on the pipes in the Russian facilities. LANL equipment experts are also used as monitors on trips to Russia to ensure that the monitoring equipment is operating properly and as special monitors at weapon component conversion facilities.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a DOE weapons laboratory located in Livermore, California and has offices in the Washington, D.C. metropolitan area. LLNL provides to the HEU Transparency Implementation program technical personnel to serve as U.S. monitors to Russian

facilities where HEU is converted into LEU; overall coordination for all U.S. monitoring trips; coordination of training courses for personnel to serve as monitors; health and safety monitoring of all personnel serving on trips to Russia, procurement, maintenance, and technical troubleshooting for hand held nondestructive analysis equipment used for measuring the enrichment of uranium in Russian containers; and, the collection and analyses for all information obtained from monitoring activities to determine the confidence levels that the Russians are abiding by the agreement; provides logistical and technical support for the bilateral Transparency Review Committee meetings, and provides technical support at meetings dealing with transparency issues. They also provide technical support and expertise on the U.S. Portsmouth GDP and commercial reactor fuel fabrication facilities, subject to the Agreement.

Lockheed Martin Energy Systems (LMES)

Lockheed Martin Energy Systems (LMES) is a DOE contractor with personnel at Y-12 and the Oak Ridge National Laboratory (ORNL) located in Oak Ridge, Tennessee. LMES also provides funding for Lockheed Martin Utility Services personnel at the Portsmouth Gaseous Diffusion Plant located in Piketon, Ohio, and the Paducah Gaseous Diffusion Plant located in Paducah, Kentucky. LMES/LMUS provides technical personnel to serve as U.S. monitors to Russian facilities where HEU is converted into LEU and as permanent presence monitors at the UEIE facility. LMES personnel participate in the training of personnel to serve as monitors and host and conduct training classes at the Y-12 plant. ORNL personnel developed non-intrusive nondestructive assay equipment for measuring the flow of uranium hexafluoride gas in the blending pipes. They are also responsible for the development, procurement, preparation of technical manuals, training of Russian and U.S. personnel, shipment of equipment, licensing in Russia, and installation of non-intrusive flow and enrichment measurement equipment on pipes in the Russian HEU dilution facilities; assistance in the analysis confidence assessment of information obtained from monitoring activities in Russia; and, assistance in hosting Russian monitoring visits to the Paducah and Portsmouth Gaseous Diffusion Plants. They also developed a demonstration test stand for the Flow and Enrichment measurement system and had the system licensed and installed at Paducah to demonstrate the operability and sensitivity of the equipment to be installed in the Russian facilities.

New Brunswick Laboratory

New Brunswick Laboratory (NBL) is a totally owned DOE lab staffed with Federal employees. NBL provides technical experts to serve as monitors on trips to Russian facilities involved in the conversion of HEU into LEU. Being Federal employees, NBL personnel serve as Team Leaders and Heads of Delegation for groups conducting HEU Transparency monitoring activities at facilities in Russia.

Oakland Operations Office

DOE's Oakland Operations Office (OAK) has offices in Berkeley and Livermore, California. Personnel at the Livermore, California office provide contract procurement and administrative oversight on contracts providing logistical and other services to U.S. monitors while conducting monitoring activities in Russia. Specifically, OAK oversees and funds a contract with the Pragma Corporation in McLean, Virginia that provides direct support through the American Business Center in Yekaterinburg, Russia,

for U.S. personnel assigned to a permanent monitoring office at Novouralsk, Russia; assistance as needed for U.S. personnel serving on special monitoring visits to Russian processing facilities; and transfer of funds to Russian facilities for reimbursable expenses associated with monitoring activities, including the installation of flow and enrichment equipment on the pipes in the Russian dilution facilities.

Oak Ridge Operations Office

DOE's Oak Ridge Operations Office (ORO) located in Oak Ridge, Tennessee, maintains and provides services as required under the bilateral transparency agreements for a permanent Russian monitoring office inside the secure area at the Portsmouth Gaseous Diffusion Plant and provides support to Russian monitors conducting monitoring activities at the Portsmouth plant. They also provide technical personnel to serve as U.S. monitors to Russian facilities where HEU is converted to LEU.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) is a DOE research laboratory located in Richland, Washington. PNNL has provided technical expertise to evaluate the applicability of advance flow technology equipment for use in Russia. PNNL also provides funding for travel costs for a PNNL employee based in Oak Ridge, Tennessee who serves as a technical expert on monitoring trips to Russian facilities involved in HEU to LEU conversion. The PNNL expert also participates in meetings associated with the analysis and confidence assessment of information obtained from monitoring activities.

Remote Sensing Laboratory

The Remote Sensing Laboratory (RSL) is a DOE laboratory located in Las Vegas, Nevada, and has offices in the Washington, DC metropolitan area. RSL provides technical experts to serve as monitors on trips to Russian facilities involved in the conversion of HEU into LEU.

Sandia National Laboratory New Mexico

Sandia National Laboratory is a DOE weapons research laboratory with facilities in Livermore, California and Albuquerque, New Mexico (SNL). SNL provides technical experts to serve as monitors on trips to Russian facilities involved in the conversion of HEU into low enriched uranium (LEU); provides for the procurement, installation, replacement, and disposal of radioactive sources required for operating the flow and enrichment monitoring equipment to be installed in the Russian HEU dilution facilities; construction of secure housings for the enrichment monitoring equipment developed by the LANL; acts as an adviser on appropriate tamper indicating devices to ensure U.S. equipment, in Russian facilities, is not unknowingly compromised; and, coordinates Russian visits to the United States for discussions related to use of U.S. monitoring equipment in Russian facilities and Russian visits to U.S. facilities subject to Russian monitoring activities.

Highly Enriched Uranium (HEU) Transparency Implementation

Mission Supporting Goals and Objectives

- *Provide support to U S facilities subject to Russian monitoring* - Under the terms of the Transparency agreements the Russian Federation may conduct monitoring visits to the Portsmouth Gaseous Diffusion Plant (PGDP) and to the five U.S. nuclear fuel fabricators that process material received from Russia subject to the Agreement. Support includes conducting pre-Russian visit trips; preparation of summary reports tracking HEU from Russia through U.S. facilities; providing interpreters for the visits; and maintaining a permanent Russian monitoring office at the Portsmouth plant.

- *Assist Russian personnel while in the U.S.* - Russia has the right to conduct up to 10 five-day monitoring trips to the U.S. nuclear fuel fabricators each year and up to six visits to the Portsmouth Gaseous Diffusion Plant each year. Additionally, Russia may have up to four individuals staff a permanent monitoring office at the Portsmouth plant. Support includes providing escorts while the Russians are in the U.S. to answer questions, and provide miscellaneous assistance as requested.

- *Conducting both special and permanent monitoring activities in Russian facilities* - Russian processing of HEU into LEU is being conducted at five processing plants located at four sites. Existing agreements permit the U.S. to conduct up to six special monitoring visits at each site and to have a permanent presence office at three Russian facilities. During FY 1998, one U.S. permanent presence office was maintained at the Ural Electrochemical Integrated Enterprise (UEIE) in Novouralsk, Russia. Activities include maintaining a pool of 200 technical experts that can serve as monitors; training of U.S. personnel serving as monitors, team leaders, and technical installers; coordinating trips to Russia; monitoring personnel's health; and providing necessary monitoring equipment.

- *Perform analysis and confidence assessments* - Collect, analyze, and evaluate all monitoring information and information from other sources to a confidence assessment of Russian compliance with the Agreement.

- *Develop new transparency measures* - Evaluate the effectiveness of existing monitoring activities, develop improved measures, and implement improvements as appropriate. Develop, fabricate, and install and use special monitoring nondestructive assay instruments to fulfill monitoring objectives.

- *Provide support in the development and negotiation of Transparency agreements including providing representation activities* - The addition of new Russian facilities requires the development and negotiation of facility specific agreements governing monitoring activities at those facilities. Problems and differences of opinion in existing monitoring agreements necessitate development of new language and negotiation strategies. The Transparency program personnel provide recommendations on draft language, proposes negotiation strategies, and provide technical and logistical support at bilateral meetings. Interagency coordination of strategies and implementing details is included in this activity.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Russian Monitoring in the U.S.	0	0	1,000	1,000	>999
Technical Support, Management, Health, Data Analysis, Confidence Assessment	0	0	3,500	3,500	>999
Permanent Monitoring Office in Russia	0	0	4,265	4,265	>999
Special Monitoring Visits to Russia	0	0	4,135	4,135	>999
Monitoring Equipment	0	0	2,850	2,850	>999
Total, HEU Transparency Implementation	0[1]	0[a]	15,750	15,750	>999

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Russian Monitoring in the U.S.			
■ Portsmouth PPO Support	0	0	500
■ U.S. Nuclear Fuel Fabricator Support	0	0	250
■ Assistance to Russians during monitoring visit	0	0	250
Total, Russian Monitoring in the U.S.	0	0	1,000
Technical Support, Management, Health, Data Analysis, Confidence Assessment, and Negotiation Support			
■ Management	0	0	1,200
■ Health Monitoring and Analysis	0	0	500
■ Data Analysis and confidence Assessment	0	0	1,000
■ Negotiation Support	0	0	800
Total, Technical Support, Management, Health, Data Analysis, Confidence Assessment, and Negotiation Support	0	0	3,500

[a] In FY 1998 and FY 1999, HEU Transparency Implementation activities were funded through Uranium Programs.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Permanent Monitoring Office in Russia			
■ Office in Novouralsk, Russia	0	0	1,715
■ Establish second office in Russia	0	0	500
■ Local logistical support	0	0	500
■ Russian facilities' reimbursements	0	0	650
■ Coordination	0	0	500
■ Monitoring Training	0	0	400
Total, Permanent Monitoring Office in Russia	0	0	4,265
Special Monitoring Visits to Russia			
■ Plant visits (13 in FY98, 24 in FY99, and 24 in FY00)	0	0	2,485
■ Russian facilities' reimbursements	0	0	250
■ Coordination	0	0	700
■ Monitoring Training	0	0	700
Total, Special Monitoring Visits to Russia	0	0	4,135
Monitoring Equipment			
■ Hand held portable nondestructive assay units	0	0	600
■ Installation of flow and enrichment units	0	0	1,000
■ Equipment maintenance and sources	0	0	1,250
Total, Monitoring Equipment	0	0	2,850
Total HEU Transparency	0	0	15,750

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Program transferred from the Uranium Programs budget	13,600
Increased permanent presence office staff	940
Develop equipment for SCH	560
Increased cost of Russian monitoring visits	650
Total Funding Change, HEU Transparency Implementation	15,750

International Nuclear Safety

Program Mission

The International Nuclear Safety and Cooperation activity is a major component of the Department's nuclear safety and national security mission. It is designed to reduce the national security and environmental threats posed by the operation of unsafe nuclear facilities worldwide, especially Soviet-designed plants, and assists the host countries to implement a self-sustaining nuclear safety improvement program capable of reaching internationally accepted safety practices. The activity supports international nuclear safety cooperation, including participation with international nuclear safety organizations. In this context, it addresses safety and environmental protection issues associated with nuclear materials facilities in the former Soviet Union. This activity originated from U.S. commitments made at the 1992 G-7 Summit to help reduce the risks associated with the continued operation of Soviet-designed reactors.

The 1986 disaster at the Chornobyl nuclear power plant revealed many flaws in the Soviet approach to nuclear power. The reactors and nuclear infrastructures left behind by the Soviet government continue to operate in nine countries. These reactors, including one that still operates at the Chornobyl site, suffer from deficiencies in training, safety procedures, and safety infrastructure. Some problems have been exacerbated by the breakup of the Soviet Union--equipment shortages are commonplace and many nuclear professionals suffer from low or erratic pay. These conditions are in addition to and exacerbated by serious flaws in the designs of some of the reactors. If not corrected, these conditions pose a continued risk of a reactor accident in Ukraine, Russia, Armenia, Kazakhstan, Lithuania, Slovakia, Czech Republic, Hungary and Bulgaria.

If another major nuclear accident occurred, the United States and the international community would be forced to deal with the political, economic and environmental destabilization of politically sensitive regions. This concern led the U. S. Government to conclude that enhancing the safety of Soviet-era nuclear reactors and establishing improved safety infrastructures in the countries that operate them is a vital national security interest of the United States. The U. S. and other Western countries have the technologies and skills to work with these nations to address nuclear safety challenges with a relatively modest investment. Rather than providing billions of dollars in foreign aid to correct all of the problems directly, the safety program helps the host countries structure their nuclear industry to address safety issues, to prevent accidents, and, as their economies improve, to increase their own funding for nuclear safety. These activities are essential to preserving these emerging, democratic, free market economies.

While serving an immediate, national security need, the program also: (1) provides an entry for U.S. industry into the economies of the host countries, which could lead to significant business opportunities in the future; and (2) addresses nuclear safety issues which, if not dealt with, could further erode public confidence in nuclear energy in the United States and other countries. In addition, the program reduces the likelihood of a nuclear accident that could adversely affect our allies and friendly countries in Europe, as well as U.S. military and civilian personnel in these countries.

Nuclear cooperation also provides opportunities for U.S. corporations to make their expertise and capabilities known to other counties, both those needing to upgrade their level of safety and those advanced countries that have their own international nuclear safety programs. Finally, the nuclear cooperation program provides opportunities to encourage other countries to support U.S. nuclear nonproliferation objectives and policies.

Program Goal

- The goal is to reduce the national security and environmental risks of nuclear power plants and nuclear facilities worldwide, especially Soviet-designed reactors, and to assist the host countries to implement self-sustaining nuclear safety improvement programs capable of reaching internationally accepted safety practices. The program supports international nuclear safety cooperation through project activities in host countries and through participation with international nuclear safety organizations. Project activities are focused to address the most significant safety issues in selected countries, including primarily those with Soviet-designed reactors.

Program Objectives

- A primary objective is to reduce risks at the 65 remaining Soviet-designed nuclear power plants and to assist the 9 host countries to implement self-sustaining nuclear safety improvement programs capable of reaching internationally accepted safety practices without encouraging long-term operation of RBMK and VVER-440/230 type plants.

- A complementary objective is to facilitate cooperation in nuclear safety worldwide. This includes participation with international nuclear safety organizations such as the International Atomic Energy Agency (IAEA), the European Bank for Reconstruction and Development (EBRD) (Nuclear Safety Account) and the Nuclear Energy Agency (NEA) of the Organization of Economic Cooperation and Development (OECD). Activities emphasize improving safety, including multi-lateral cooperation on the safety of Soviet-designed reactors, the socioeconomic aspects of reactor shutdown, and the environmental aspects associated with nuclear materials, including the effects of the Chornobyl accident, and establishing safety-based nuclear infrastructures, including bilateral cooperation on nuclear safety and environmental centers.

- Another complementary objective is to reduce the nuclear danger associated with the facilities for the treatment, storage and disposition of highly enriched uranium and plutonium derived from various origins, including dismantled warheads, as directed in the FY 1999 National Defense Authorization Act.

- The program also assists other Federal agencies that carry out related activities such as the cessation of weapons grade plutonium production in Russia and a variety of projects supporting shutdown of the Chornobyl nuclear power plant and improvement of the nuclear power infrastructure in Ukraine.

Performance Measures

Activities are divided into key technical areas as follows: management and operational safety projects, engineering and technology projects, plant safety assessments, fuel cycle safety projects, nuclear regulatory and institutional framework projects, and Chornobyl initiatives. Advancements are needed in each of these areas to improve safety in the host countries. The technical areas were selected based upon the results of IAEA studies that summarize and prioritize hazards at Soviet-designed plants. The selection criteria for projects in these technical areas address: priority of safety needs; cost-effectiveness; and host-country commitment to ensure sustainability after U.S. support ends. In addition, work is selected in coordination with other bilateral and internationally sponsored safety programs to ensure U.S. projects complement activities undertaken by others. End point criteria for each specific technical area have been established to ensure that program activities are aimed toward a defined and successful completion.

The following significant accomplishments are planned for completion in FY2000 and will be used to measure performance:

- Complete full-scope simulator for Russia's Kalinin plant unit 1, and Ukraine's South Ukraine unit 3. Complete Slovakia's Trnava Training Center full scope simulator upgrade.
- Complete safety parameter display system at Russia's Kursk plant unit 3, and at Ukraine's South Ukraine plant unit 2, Rivne plant unit 3, Zaporizhzhya plant unit 3, and Armenia's plant unit 2.
- Complete in-depth safety assessment at Russia's Novovoronezh plant.
- Complete implementation of a configuration management program at Russia's Balakovo plant and at Ukraine's Zaporizhzhya plant.
- Complete implementation of event analysis and reporting program at Ukraine's Zaporizhzhya plant.
- Complete transferring training methodology, including implementation of highest priority courses, at all plants in Russia, Ukraine, Lithuania, Bulgaria, and Armenia.
- Complete improvements in nondestructive examination in-service inspection and safety maintenance technology transfer to the Armenia plant and to plants in Russia and Ukraine.
- Complete implementation of a reliability database in Russia and Ukraine for use by all plants in those countries.
- Complete control and protection system upgrade at Lithuania's Ignalina plant unit 2.
- Complete first safety analysis joint projects with international nuclear safety center in Russia.

- Identify and initiate technology transfer and cooperative project activities at environmental centers in the U.S. and Russia.

- Conduct initial nuclear materials safety activities in Russia: training, joint program plan, materials safety masters degree program, and initial safety assessments.

- Complete an in-depth safety assessment at Russia's Leningrad plant.

Significant Accomplishments and Program Shifts

- In October 1998, the Department of Energy transferred the Office of International Nuclear Safety and Cooperation to the Office of Nonproliferation and National Security (NN).

- The Office has the same mission, and also addresses the safety of Russian materials facilities, and coordinates and cooperates on nuclear safety worldwide.

- Numerous projects have been completed and safety has been improved at plants in eight countries with Soviet-designed nuclear power plants. Many of the projects have reduced risks immediately by decreasing the likelihood of equipment malfunction and operator error. Others promote safety in the long-term by improving technical skills and fostering a culture in which safety is the top priority. Specific accomplishments include:

  - Nuclear training centers were established at the Balakovo site in Russia and the Khmelnytskyy plant in Ukraine. U.S.-trained instructors have in turn trained more than 3,000 workers on maintenance, operations, and employee safety.

  - Simulator projects have been completed for training reactor operators: Khmelnytskyy unit 1 full scope simulator; Novovoronezh unit 3 analytical simulator; Chornobyl unit 3 analytical simulator. These simulators are critical for training plant personnel to operate the reactors safely.

  - Projects have been completed to improve safety procedures and practices for quality assurance, configuration management, event analysis and reporting, emergency operating instructions, safety maintenance, and nondestructive examination. More than 200 staff members from 14 nuclear reactor sites in Russia, Ukraine, Armenia, Lithuania, Slovakia, Czech Republic, Hungary and Bulgaria have worked with personnel at 12 U.S. nuclear power plants. U.S. specialists transferred technology for developing symptom-based emergency operating instructions to pilot plants in these countries. Symptom-based instructions enable control room operators to stabilize a reactor quickly during an abnormal event. Pipe lathe/weld preparation machines were provided to the five plants with RBMK reactors, enabling workers to cut and replace flawed pipes with precision. Previously, workers cut pipes by hand, increasing the difficulty of welding in a new pipe and thus the risk of subsequent leaks that could lead to a loss-of-coolant accident. Equipment for valve-seat resurfacing, vibration monitoring and shaft alignment, and nondestructive examination was provided also.

- Fire safety equipment was provided to plants in Armenia, Ukraine, Russia and Bulgaria. Russia's Kola and Kursk plants and Bulgaria's Kozloduy plant received backup power systems for emergency shutdowns. Russia's Kursk and Novovoronezh plants have received a mobile pumping unit for emergency water supplies. With U.S. support, Kola personnel have reduced leaks in the radiation confinement system. Bulgaria's Kozloduy plant received thermal imaging hardware that identifies "hot spots" in the plant's electrical system. U.S. and host country experts have defined methodologies for conducting fire hazards analysis at Soviet-designed reactors, and pilot analyses are under way at Russia's Smolensk plant and Ukraine's Zaporizhzhya plant. After U.S. training, companies in Ukraine and in Russia developed the capability to manufacture fire doors that meet international standards.

- Safety Parameter Display Systems (SPDS) enable control room operators to assess abnormal conditions rapidly and take corrective actions. SPDS projects have been completed at Kursk unit 2; Novovoronezh units 3 and 4; Chornobyl unit 3; Khmelnytskyy unit 1, Zaporizhzhya unit 5, and South Ukraine unit 1.

- Computer analysis codes and methodologies were transferred to host-country specialists to assess plant safety and set priorities for safety upgrades. Plant analyzers were provided for Bulgaria's Kozloduy plant and for Lithuania's Ignalina plant. International nuclear safety centers in the U.S. and Russia have been established to sponsor projects to improve information sharing and safety improvement.

- At Ukraine's Zaporizhzhya plant, cooling ponds for storing spent fuel rods are nearly full. The Program delivered equipment and trained personnel to build and regulate a safe, modern dry-cask storage system. The system will reduce the need to send spent fuel to Russia for reprocessing, which will alleviate national security concerns, and still allow the plant to operate.

- U.S. and Ukrainian specialists established the International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology in the town of Slavutich, near Chornobyl, to support projects in data analysis, spent fuel management, and reactor closure. Projects have been completed at Chornobyl's operational unit 3 reactor to improve training, safety maintenance, fire protection, and procedures for safer operations.

Funding Profile

(dollars in thousands)

	FY 1998 Appropriation	FY 1999 Appropriation	FY 2000 Request
International Nuclear Safety	70,000	30,000	34,000
Total, International Nuclear Safety [a]	70,000	30,000	34,000

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland Operations Office					
Pacific Northwest National Laboratory	61,500	23,000	25,450	2,450	10.6%
Chicago Operations Office					
Argonne National Laboratory	5,100	4,600	6,050	1,450	31.5%
Brookhaven National Laboratory	2,400	1,400	1,500	100	7.1%
Total, Chicago Operations Office	7,500	6,000	7,550	1,550	25.8%
All Other Sites [b]	1,000	1,000	1,000	0	0.0%
Total, International Nuclear Safety	70,000	30,000	34,000	4,000	13.3%

[a] Total includes funding that the program received from AID for nuclear safety and cooperation activities for Ukraine and Armenia in FY1998 ($35 million). Total excludes funding that the program may receive from AID for nuclear safety and cooperation activities in Ukraine and Armenia in FY 1999 and FY 2000.

[b] Funding provided to Department of Energy Headquarters, support offices in Paris and Tokyo, other laboratories and miscellaneous contractors.

Site Description

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) is one of the U.S. Department of Energy's multi-program national laboratories. PNNL is the lead laboratory for the Soviet-designed reactor safety activities. Staff at PNNL provides management, technical, contracting, and administrative support to the program in the areas of Soviet-designed reactor safety and international cooperation.

Argonne National Laboratory

Argonne National Laboratory (ANL) is one of DOE's largest research centers. It is also the nation's first national laboratory chartered in 1946. Argonne occupies two sites. The Illinois site is surrounded by forest preserve about 25 miles southwest of Chicago's Loop. The Argonne West site occupies about 900 acres about 50 miles west of Idaho Falls in the Snake River Valley. Argonne also maintains offices in the Washington, D.C. metropolitan area. ANL oversees the nuclear plant in-depth safety analyses and international nuclear safety center portions of the program.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a DOE scientific research laboratory located on Long Island, New York. BNL oversees simulator installation and training program implementation.

International Nuclear Safety

Mission Supporting Goals and Objectives

Specific activities at Soviet-designed nuclear power plants and facilities supporting the goals and objectives are described below.

Objectives will be achieved through completion of a series of joint U.S./host country projects in which U.S. technology, equipment, methods and experience are transferred in the areas of training and simulators, operating and emergency procedures, safety maintenance, safety system upgrades, fire safety, reactor safety analysis, and regulatory improvement. U.S. studies show that operator error is a significant factor in nuclear accidents. Most of the projects, especially emergency operating instructions, training, simulators, and safety parameter display systems (SPDS), directly support improving the capability of operators. More than 200 individual projects have been initiated with the participation of 20 Soviet-designed plant sites and include the participation of 46 U.S. commercial companies to provide equipment and technical expertise.

Nuclear training centers have been established at the Balakovo site in Russia and the Khmelnytskyy plant in Ukraine. U.S.-trained instructors have trained more than 3,000 workers. Instructors developed and conducted job-specific maintenance and operations courses, along with courses in employee safety and supervisory skills. These instructors will work with U.S. experts to transfer the training methodology and materials to other plants in Russia, Ukraine, and other countries with Soviet-designed reactors.

Simulator projects have been completed for training reactor operators: Khmelnytskyy unit 1 full scope simulator; and Novovoronezh unit 3 and Chornobyl unit 3 analytical simulators. Additional simulator projects are in progress at:

- Kola unit 4 full scope simulator; Balakovo unit 4 analytical simulator and full scope simulator upgrade; Kalinin unit 2 full scope simulator; Bilibino analytical simulator
- South Ukraine units 1 and 3 full scope simulators; Rivne unit 3 full scope simulator; Zaporizhzhya unit 1 full scope simulator and unit 5 full scope simulator upgrade
- Trnava training center full scope simulator upgrade

Follow-on activities after completion of simulators include: maintenance and support for initial simulator operations; modification of a simulator to include SPDS capability; and provision of simulator training materials.

Management and operational safety is improved by projects at pilot plants to develop modern safety procedures and practices for quality assurance, configuration management, event analysis and reporting, emergency operating instructions, safety maintenance, nondestructive examination, and use of a reliability database to prioritize activities. More than 200 staff members from 14 nuclear reactor sites in Russia, Ukraine, and Central and Eastern European countries have worked with personnel at 12 U.S.

nuclear power plants. U.S. specialists transferred skills for developing symptom-based emergency operating instructions to pilot plants in Ukraine, Russia, and Central and Eastern Europe. Symptom-based instructions enable control room operators to stabilize a reactor quickly during an abnormal event. Pipe lathe/weld preparation machines were provided to the five plants with RBMK reactors. Previously, workers cut pipes by hand, increasing the difficulty of welding in a new pipe and thus the risk of subsequent leaks that could lead to a loss-of-coolant accident. Valve-seat resurfacing equipment, vibration monitoring and shaft alignment systems and nondestructive examination equipment also were provided

SPDS's enable control room operators to assess abnormal conditions rapidly and take corrective actions. SPDS projects have been completed: Kursk unit 2; Novovoronezh units 3 and 4; Chornobyl unit 3; Khmelnytskyy unit 1; Zaporizhzhya unit 5; South Ukraine unit 1. SPDS projects are underway at:

- Kursk units 3 and 4; Leningrad units 3 and 4; Smolensk units 2 and 3
- South Ukraine unit 2; Zaporizhzhya units 1, 2, 3, 4 and 6
- Armenia unit 2.

SPDS projects are planned for South Ukraine unit 3; Rivne unit 3; Leningrad unit 2; and Smolensk unit 1.

Fire safety and other hardware upgrades are provided to selected plants. Equipment was provided to plants in Armenia, Ukraine, Russia and Bulgaria. Russia's Kola and Kursk plants and Bulgaria's Kozloduy plant received backup power systems to supply electricity during emergency shutdowns. Russia's Kursk plant and Novovoronezh plant received mobile pumping units for emergency water supplies. With U.S. support, Kola personnel substantially reduced leaks in the radiation confinement system. Bulgaria's Kozloduy plant received thermal imaging hardware that identifies "hot spots" in the plant's electrical system. U.S. and host country experts have defined methodologies for conducting fire hazards analyses at Soviet-designed reactors, and pilot analyses are under way at Russia's Smolensk plant and Ukraine's Zaporizhzhya plant. After U.S. training, companies in Ukraine and in Russia have manufactured more than 800 fire doors that meet international standards. The doors are for four plants. Safety upgrades are planned for the three Russian plutonium production reactors once they are converted to civilian operations.

Safety analysis activities and safety assessment infrastructure projects will be provided to selected plants. In-depth safety assessments (ISA) are conducted to determine the most significant risks and set priorities for safety upgrades. ISA projects are in progress at:

- Kola units 1, 2 and 4; Kursk unit 1; Leningrad unit 2; Novovoronezh units 3 and 4
- Zaporizhzhya plant; Rivne plant; Khmelnytskyy plant; South Ukraine plant

Computer analysis codes and methodologies are transferred to host-country specialists to assess plant safety, identify risks, and set priorities for safety upgrades. Plant analyzers were provided to Bulgaria's Kozloduy plant and to Lithuania's Ignalina plant. International nuclear safety centers were established in the U.S. and Russia to sponsor projects to improve information sharing and safety improvements

through prompt analysis of potential safety problems. The centers provide a repository of nuclear safety information and maintain a core knowledge base through shared information and leveraged funding through joint projects. Several projects are underway. Companion centers are planned in other countries, such as Kazakhstan.

At the Zaporizhzhya plant in Ukraine, cooling ponds for storing spent fuel rods are nearly full. The U.S. has delivered equipment and trained Ukrainian personnel to build and regulate a safe, modern dry-cask storage system. The system will reduce the need to send spent fuel to Russia for reprocessing, which will alleviate national security concerns, while still allowing the plant to operate.

The program has reduced risks at Chornobyl's operational unit 3 reactor with projects on training, safety maintenance, and fire protection. U.S. and Ukrainian specialists established the Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology in the town of Slavutich, near Chornobyl. The Center provides technical support to the Ukrainian nuclear power industry and serves as a focal point for international cooperation at Chornobyl. Joint projects in data analysis, spent fuel management, and reactor closure are under way. The plan is for the Center to continue operations on its own after it is fully established.

Nuclear safety regulatory and legislative support is planned for several countries, including Russia and Ukraine, in order to develop a strong and independent regulatory infrastructure in the area of nuclear facilities. Support includes topical workshops and development of technical standards.

Projects are planned to support the restructuring and commercialization of the nuclear industries so that, as economies improve, there will be increased revenues available for nuclear safety upgrades.

The Office supports representation at IAEA, EBRD, and NEA activities. Activities include representation at coordinating committees (e.g., Japan, European Commission, Korea, China), workshops, student exchanges, and support of cooperation offices for U.S. personnel in Paris and Tokyo. Activities will provide technical cooperation and support on a variety of nuclear safety topics to improve safety or to address the environmental aspects associated with nuclear materials from power plants, submarines, and other nuclear facilities. Activities address decommissioning and the effects of the Chornobyl accident.

Activities include establishing international environmental safety centers in the U.S. and Russia. The centers will develop and maintain the infrastructure necessary to manage nuclear facility cleanup, facility conversion to other uses, and waste disposition; and to develop and implement specific environmental safety projects. The centers will be established based on the existing DOE-supported international nuclear safety center model. The centers will focus on cooperative activities to mitigate the environmental effects of our respective defense and civil nuclear programs while contributing to the redeployment of Russian scientists. Addressing critical nuclear-related environmental issues will reduce the risk that they will lead to significant threats to human health or the environment. The centers would also serve as a means for U.S. companies to develop and demonstrate environmental technologies for use at U.S. sites and to demonstrate their capabilities in foreign markets.

Activities also address safety infrastructure. This support will help prevent a repeat of safety problems which developed in the former Soviet Union.

Project activities include conducting a series of workshops on nuclear materials safety management; conducting joint facility safety research, university advanced degree programs and on-site safety management training, and conducting lab-to-site comparative technical studies of safety processes and procedures involving plutonium storage, conversion and transportation.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
International Nuclear Safety	70,000	30,000	34,000	4,000	13%
Total, International Nuclear Safety *	70,000	30,000	34,000	4,000	13%

* Total includes funding that the program received from AID for nuclear safety and cooperation activities for Ukraine and Armenia in FY1998 ($35 million). Total excludes funding that the program may receive from AID for nuclear safety and cooperation activities in Ukraine and Armenia in FY 1999 and FY 2000.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Operational safety. Conduct projects at pilot plants to improve quality assurance, configuration management, event analysis and reporting, emergency operating instructions, safety maintenance, nondestructive examination, and reliability database	7,185	3,974	4,450
■ Training and simulators. Transfer training methodology and highest priority training courses from training centers to other plants at all countries with Soviet-designed plants. Provide simulators or simulator support to selected plants, including simulator training, engineering support, and spare parts for Russia, Ukraine, Slovakia, and Bulgaria. Full scope simulators for Rivne units 2 and 3, South Ukraine units 1 and 3, and Zaporizhzhya units 1 and 5	19,486	880	1,400
■ Engineering and technology. SPDSs for Leningrad unit 2, Smolensk units 2 and 3, and Novovoronezh units 3 and 4. Fire safety and other hardware upgrades for Russia and Ukraine: Smolensk, Seversk units 1-2, South Ukraine units 1-3. Battery supply for Ignalina, Balakovo. Ignalina control and protection system upgrade units 1-2. Ignalina electronic module replacement unit 2. Upgrades to Armenia plant: fire safety, cooling ponds, steam isolation valves, and feedwater system	15,192	11,026	12,700
■ Safety assessment infrastructure. Provide and train in use of U.S. safety codes to evaluate safety issues in all countries with Soviet-designed plants. Kola, Kursk, Leningrad and Novovoronezh safety evaluations. In depth safety assessments for Khmelnitsky unit 1, South Ukraine unit 1, and Rivne unit 1	12,987	4,500	4,500
■ Nuclear safety regulatory and legislative support. Develop an independent regulatory infrastructure for nuclear facilities, including topical workshops and development of technical standards	1,150	450	450
■ International nuclear safety centers. Complete selected analytical projects and maintain a safety database of nuclear data	1,500	1,320	1,650

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ International nuclear safety activities support and infrastructure. Support Department of Energy representative in Paris at the U.S. Mission to the Organization for Economic Cooperation and Development and the U.S. Embassy in Tokyo to maintain constructive engagement in promoting nuclear safety and curbing nuclear proliferation. Infrastructure support activities, including IAEA, EBRD, and NEA activities; coordinating committees, workshops, student exchanges	1,000	1,100	1,200
■ Program management and administration. Senior technical management, foreign support offices, financial management, quality assurance, contracts administration, and information and communications products and services	5,000	5,000	4,800
■ Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology and it's technical branch Slavutich Laboratory for International Research and Technology; project and infrastructure support, monitoring of Chornobyl shelter implementation plan	0	1,100	1,200
■ Kazakhstan safety infrastructure and nuclear safety center, address fuel transfer issues, shutdown and decommissioning planning	0	500	350
■ Chornobyl heat plant	3,000	0	0
■ International environmental safety centers. Initiate technology transfer and cooperative projects in the U.S. and Russia	0	100	800
■ Nuclear materials safety. Complete advanced workshops and training on nuclear materials safety, and curriculum for nuclear materials safety graduate degree program in Russia. Complete initial assessment of safety management systems at Russian nuclear materials facilities	0	50	500
■ Nuclear Fuels Qualification. Project will provide Ukraine the capability to obtain fuel from a qualified U.S. Vendor	3,500	0	0
Total, International Nuclear Safety [a]	70,000	30,000	34,000

[a] Total includes funding that the program received from AID for the nuclear safety and cooperation activities for Ukraine and Armenia in FY1998 ($35 million). Total excludes funding that the program may receive from AID for nuclear safety and cooperation activities in Ukraine and Armenia in FY 1999 and FY 2000.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ Engineering and technology. Project to implement safety parameter display system at Leningrad plant unit 2.	2,350
■ Training and simulators. Project to integrate the safety parameter display system capability into the Leningrad plant full-scope simulator.	500
■ International environmental safety centers. Centers will support timely and economic mitigation of several of the world's most unstable environmental sites, and lower the risk of further environmental disasters	700
■ Nuclear materials safety. Project to reduce the nuclear danger associated with the facilities for the treatment, storage and disposition of highly enriched uranium and plutonium derived from various origins, including dismantled warheads as directed in the FY 1999 National Defense Authorization Act	450
Total Funding Change, International Nuclear Safety	+4,000

Nonproliferation and National Security Program Direction

Mission Supporting Goals and Objectives

The Nonproliferation and National Security (NN) program direction budget provides for all Federal personnel required at DOE Headquarters, and three field offices to carry out the program's mission in a cost effective and efficient manner.

Program Goal

Provides the salaries and benefits, travel, support service contracts, and other related expenses associated with the overall management, direction, and administration of the following programs:

Verification and Control Technology
- Nonproliferation and Verification Research and Development
- Arms Control and Nonproliferation

Nuclear Safeguards and Security
Security Investigations
Emergency Management
International Nuclear Safety (FY 2000 only)
Highly Enriched Uranium Transparency Implementation Program (FY 2000 only)
Intelligence (FY 1998 and FY 1999 only)

Program Objectives

- To provide Salaries and Benefits for NN Federal compensation including overtime, awards, lump sum leave payments, transit subsidy, contributions to employee benefits, and associated escalation.
- To provide travel funds that are required to carry out program mission while away from official duty stations, per diem allowances as well as local travel, and to fund the Executive Protection Security Program travel which has been realigned in FY 2000 from the Office of the Secretary of Energy to the Office of Nonproliferation and National Security. Travel is an essential part of staff duties in order to conduct hands-on operations both domestically and internationally, participate in highly technical agency and interagency committees, and to ensure appropriate Government representation in policy meetings.
- To provide Support Services contracts funding for multiple program areas:
  - provide Support Services contracting funding for the Classification/Declassification mission at DOE. Supports review of documents under Executive Order 12958 and Public Law 105-261 and provides funds dedicated to declassification/litigation support review

activities to avoid contempt and monetary sanctions under the Freedom of Information Act.

- provide technical, analytical, administrative, and operational support in multiple program areas such as arms control; safeguards and security; emergency management; and research and development. The daily operation and associated technical direction of the contracts remain with Federal program managers in each organization.
- beginning in FY 2000 also provides Support Services for the Department's Critical Infrastructure Protection (CIP) Program.

- To provide Other Related Expenses, including the working capital fund (space, utilities, general printing, graphics, copying, supplies, telephones, etc.), general office automation support, operation and maintenance of equipment, and other miscellaneous services.

Performance Measures

The principle objective of Program Direction is to provide the appropriate level of funding in the four categories supported in this budget: Federal salaries and benefits, travel, support services, and other related expenses.

- The ultimate measure for success in the Program Direction subprogram is whether the Federal personnel in the various programs in Nonproliferation and National Security have their salaries and benefits provided, travel funding is adequate to allow the appropriate amount of onsite supervision by the Federal staff, and the level of support services provided to the Federal staff is adequate to allow NN to perform its programmatic goals and objectives.
- The performance measure for the support of the business line activities funded under the Working Capital Fund (WCF) is to control costs associated with these business lines where possible and to adequately fund these activities through the budget process. NN regularly monitors all business lines funded in the WCF and has reduced, to the extent possible, utilization of services provided through this fund. Further per capita reductions, in keeping with good business practices, in utilization of the services provided through this fund is a performance measure NN sets for itself in this account.

Funding Schedule

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago					
Salaries and Benefits	3,803	3,894	4,069	+175	+4 5%
Travel	150	150	153	+3	+2 0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	1,551	1,593	1,627	+34	+2.1%
Total, Chicago	5,504	5,637	5,849	+212	+3 8%
Full Time Equivalents	54	56	56	0	0.0%
Nevada					
Salaries and Benefits	682	621	450	-171	-27.5%
Travel	46	46	46	0	0.0%
Support Services	352	400	379	-21	-5.3%
Other Related Expenses	4	4	4	0	0.0%
Total, Nevada	1,084	1,071	879	-192	-17.9%
Full Time Equivalents	6	5	5	0	0.0%
Oakland					
Salaries and Benefits	0	0	110	+110	+100.0%
Travel	0	0	0	0	0.0%
Support Services	0	0	0	0	0 0%
Other Related Expenses	0	0	20	+20	+100.0%
Total, Oakland	0	0	130	+130	+100.0%
Full Time Equivalents	0	0	1	+1	+100.0%
Headquarters					
Salaries and Benefits	36,825	36,806	34,852	-1,954	-5.3%
Travel	2,010	2,048	2,501	+453	+22.1%
Support Services					
Support Services - Other	14,170	17,317	15,041	-2,276	-13.1%
Support Services - Declassification	7,805	8,509	15,888	+7,379	+86.7%
Support Services - CIP	0	0	900	+900	+100.0%
Total, Support Services	21,975	25,826	31,829	+6,003	+23.2%
Other Related Expenses	15,502	15,512	14,410	-1,102	-7.1%
Total, Headquarters	76,312	80,192	83,592	+3,400	+4.2%
Full Time Equivalents	338	347	312	-35	-10.1%

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Total Nonproliferation and National Security					
Salaries and Benefits	41,310	41,321	39,481	-1,840	-4.5%
Travel	2,206	2,244	2,700	+456	+20.3%
Support Services					
Support Services - Other	14,522	17,717	15,420	-2,297	-13.0%
Support Services - Declassification	7,805	8,509	15,888	+7,379	+86.7%
Support Services - CIP	0	0	900	+900	+100.0%
Total, Support Services	22,327	26,226	32,208	+5,982	+22.8%
Other Related Expenses	17,057	17,109	16,061	-1,048	-6.1%
Total, Program Direction	82,900	86,900[a]	90,450[b]	+3,550	+4.1%
Full Time Equivalents	398	408	374	-34	-8.3%

[a] FY 1998 and FY 1999 Appropriation included Intelligence program funding.

[b] In FY 2000 the International Nuclear Safety Program and Highly Enriched Uranium (HEU) Transparency Programs were transferred into the Nonproliferation and National Security Program. Funding for the HEU program was formerly in the Energy Supply Research and Development appropriation.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Headquarters federal staffing is driven by specific functional responsibilities as well as management and direction requirements.			
■ NN is the focal point within the Department for activities that support the President's nonproliferation policy, goals and objectives, and activities which assist other Departmental and field elements achieve their missions.			
■ The Intelligence program was budgeted for in this account in FY 1998 and FY 1999. The program is transferred out of NN in the FY 2000 budget.			
■ Staff directs and manages multiple technology and research and development tasks.			
■ NN staff serves as the Headquarters operational element for activities such as emergency management, security, and declassification and classification operations.			
■ Staff develops department-wide policy and plans for national security programs such as safeguards and security, declassification and classification. NN is directly responsible for management of the New Brunswick National Laboratory, the Nonproliferation and National Security Institute in Albuquerque, New Mexico, and the HAZMAT Spills Test Facility at the Nevada Test Site.			
■ The International Nuclear Safety staff and program, were combined with the NN program in FY 2000. The staff directs and manages multiple projects designed to reduce risks at nuclear power plants worldwide.	41,310	41,321	39,481
Travel			
■ Includes domestic and foreign trips necessary to conduct nonproliferation and national security business.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ International travel is necessary due to the continuous work with international agencies and the Former Soviet Union republics. Domestic travel includes national security assistance and interface with field offices, laboratories and local governments.			
■ Nonproliferation issues and program interface also require domestic travel.			
■ FY 2000 provides travel for the Executive Protection Security personnel. This activity has been realigned from the Office of the Secretary of Energy to the Office of Nonproliferation and National Security ($366).	2,206	2,244	2,700
Support Services			
■ Provides an invaluable resource of highly specialized and analytical expertise required to meet critical nonproliferation and national security issues.			
■ Provides support to declassification objectives while ensuring that national security is not jeopardized through inadvertent release of classified nuclear related design information.			
■ Provides implementation of cost-saving safeguards and security measures, technical, analytical and support expertise essential to a balanced safeguards and security program. Provides technical expertise capable of addressing technology advancements and the dynamic changing environment associated with weapons returns, arms control, and nonproliferation.			
■ Provides support to objectives of the arms control materials protection, control and accounting program and to provide technical assistance appraisals, emergency response tests and exercises.			
■ Provides technical analyses and support of future proliferation detection and treaty verification; and to review and assess technology and program status.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provides a proactive program that interfaces with the private sector, other government agencies, and the executive branch in establishing mutual support arrangements in the furtherance of the DOE Critical Infrastructure Protection Program.	22,327	26,226	32,208
Other Related Expenses			
■ Includes Headquarters space, utilities, general printing, graphics, copying, supplies, telephones, general automation support, payroll outsourcing, postage, and other miscellaneous expenses associated with office operations.			
■ Similar support is provided to the Federally staffed New Brunswick Laboratory.			
■ NN funding for the Working Capital Fund is included in this subprogram.	17,057	17,109	16,061
Total, Program Direction	82,900	86,900	90,450

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ The Intelligence program is not included in the FY 2000 request but was included in the FY 1999 and FY 1998 appropriations. The International Nuclear Safety Program and the Highly Enriched Uranium Transparency Program is budgeted for in the FY 2000 request but not in NN's FY 1999 appropriation. The change is a net reduction in Salaries and Benefits following the transfer out of the Intelligence program, the addition of the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Implementation Program, and some escalation.	-1,840
Travel	
■ Travel increase is the net result of transfer out of the Intelligence Program and the transfer in of the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Implementation Program, the realignment of the Executive Protection Security personnel travel costs, and a small increase for escalation.	+456
Support Services	
■ Support Services - Other is a net reduction resulting from the transfer out of the Intelligence program, a reduction to partially fund escalation for federal salaries and benefits, and to fund Executive Protection Security Program travel that has been realigned into the NN program.	-2,297
■ Support Services - Declassification have been increased to fund implementation of Public Law 105-261 and to support halting the growth of the FOIA backlog.	+7,379
■ Support Services - CIP is an increase to fund the Critical Infrastructure Protection Program.	+900
Related Expenses	
■ Other Related Expenses have been reduced to partially fund escalation for Federal salaries and benefits, transfer out of Intelligence, and transfer in of HEU and International Nuclear Safety Program.	-1,048
Total Funding Changes, Program Direction.	+3,550

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Other Support Services	12,344	15,059	13,107	-1,952	-13.0%
Declassification and Classification	6,634	7,233	13,505	+6,272	+86.7%
Critical Infrastructure Program	0	0	700	+700	+100.0%
Total Technical Support Services	18,978	22,292	27,312	+5,020	+22.5%
Management Support Services					
Other Support Services	2,178	2,658	2,313	-345	-13.0%
Declassification and Classification	1,171	1,276	2,383	+1,107	+86.8%
Critical Infrastructure Program	0	0	200	+200	+100.0%
Total, Management Support Services	3,349	3,934	4,896	+962	+24.5%
Total Support Services	22,327	26,226	32,208	+5,982	+22.8%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund[a]	7,308	7,803	7,813	+10	+0.1%
Training	291	332	332	0	0 0%
Other[b]	9,458	8,974	7,916	-1,058	-11.8%
Total, Other Related Expenses	17,057	17,109	16,061	-1,048	-6.1%

[a]The Working Capital Fund is composed of the following sub-parts:

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund					
Rental Space	5,437	5,864	5,874	+10	+0.2%
Telecommunications, Utilities and Miscellaneous Charges	764	784	784	0	0.0%
Printing and Reproduction	295	308	308	0	0.0%
Purchase of Goods & Services and Supplies & Materials	291	267	267	0	0.0%
Other Working Capital Fund (includes such business lines as Networking, Electronic Services, Mail Services, Contract Closeouts, and Payroll)	521	580	580	0	0.0%
Total, Working Capital Fund	7,308	7,803	7,813	+10	+0.1%

[b]Other includes equipment and the operation and maintenance of equipment.

Intelligence

Intelligence

Executive Budget Summary

Mission

The Intelligence mission is to provide the Department, other US Government policymakers, and the Intelligence Community with timely, accurate, high impact foreign intelligence analyses; to provide quick-turnaround, specialized technology applications and operational support to the intelligence, special operations, and law enforcement communities; and to ensure that the Department's technical, analytical and research expertise is made available to the Intelligence Community in accordance with Executive Order 12333, "United States Intelligence Activities." The Office of Intelligence supports the National Security business line of the DOE Strategic Plan.

Strategy

The post-Cold War environment continues to evolve and remain uncertain. Consequently, the nature and scope of the Department's Intelligence Activities continue to be influenced by a variety of international events and trends Proliferation of nuclear weapons and materials into the hands of rogue states and terrorist groups continues to be a danger. The Office of Intelligence continues to be committed to preserving a modus operandi that allows its resources and programs to be receptive on short notice to changing world situations. Technical and analytical intelligence support to US efforts will be instrumental in improving nuclear materials protection, control, and accountability in the former Soviet Union; assisting in the safe and secure dismantlement of former Soviet nuclear weapons; verifying foreign compliance with international treaties and other commitments in the nuclear arena; limiting and redirecting North Korea's nuclear weapons program; assess international terrorism and support US nuclear-related operations, addressing the challenge of global nuclear proliferation through the innovative and broad application of DOE assets; encouraging and facilitating the application of DOE laboratory expertise to Intelligence Community technology development requirements; and providing specialized technical support to operations in the intelligence, law enforcement, and special operations communities.

The Office of Intelligence will continue to make the Department's unique expertise available to the other Intelligence Community members and policy agencies. We will continue to use the unique expertise in the National Laboratory complex to analyze foreign nuclear capabilities and address issues of nuclear proliferation. The FY 2000 strategic focus for this office is to continue to be a center of excellence for support to national policymakers.

Major Changes

The Office of Intelligence, formerly part of the Office of Nonproliferation and National Security, was reorganized into an independent office.

Site Funding and Federal and Contractor Staffing Profiles

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Kansas City	370	370	370	0	0%
Los Alamos National Laboratory	4,977	4,977	4,977	0	0%
Pantex	275	275	275	0	0%
Sandia National Laboratories	4,475	4,475	4,475	0	0%
Chicago Operations Office					
Argonne National Laboratory	300	300	300	0	0%
Idaho Operations Office					
Idaho National Engineering Laboratory	700	700	700	0	0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	4,975	4,975	4,975	0	0%
Oak Ridge Operations Office					
Y-12 Site, Oak Ridge	2,015	2,015	2,015	0	0%
Richland Operations Office					
Pacific Northwest Laboratory	4,800	4,800	4,800	0	0%
Savannah River Operations Office					
Savannah River Technology Center	961	961	961	0	0%
Nevada Operations Office	3,300	3,300	3,300	0	0%
Office of Scientific & Technical Information	52	52	52	0	0%
Washington Headquarters	7,300	8,859	8,859	0	0%
Total Intelligence	34,500	36,059	36,059	0	0%
Full Time Equivalents					
Federal	38	38	38	0	0%
Laboratory	108	108	108	0	0%
Total Full Time Equivalents	146	146	146	0	0%

Program Performance Measures

The most meaningful performance measure for the Office of Intelligence is the contribution of its intelligence products (briefings, studies, assessments, analyses, technologies, and operational support) to the attainment of US national security objectives, particularly in the areas of nonproliferation, counterproliferation, international arms control treaties, counterterrorism, and special operations/low-intensity conflict. Our intelligence products and unique support will assist decisionmakers in the

formulation and implementation of new policy initiatives to meet changing global realities. We will provide early warning to decisionmakers of local, regional, or international crisis situations that require modified or new policy actions or initiatives, enhance existing policies through the provision of value-added intelligence information to decisionmakers; develop specialized technology applications to meet short term national security requirements; assess international terrorism for DOE policy makers; provide a conduit for timely nuclear and nuclear-related intelligence assessments and reporting to support U.S. operations; and provide on-call, rapid response technical capabilities to support specialized intelligence, as well as other government operational missions.

Lawrence H. Sanchez

Date 1/21/99

Intelligence

Program Mission

The Intelligence mission is to provide the Department, other US Government policymakers, and the Intelligence Community with timely, accurate, high impact foreign intelligence analyses; to provide quick-turnaround, specialized technology applications and operational support to the intelligence, special operations, and law enforcement communities; and to ensure that the Department's technical, analytical and research expertise is made available to the Intelligence Community in accordance with Executive Order 12333, "United States Intelligence Activities." The Office of Intelligence supports the National Security business line of the DOE Strategic Plan.

Program Goal

The goal of the Intelligence Program is to support the National Security of the United States and have a direct impact on the policy making process by providing actionable intelligence and/or analytical and technology support to the Intelligence Community. Analysis from the Department's intelligence program serves the following core policy areas: nuclear proliferation and weapons analysis; science and technology (S&T), energy security; nuclear energy, safety and waste; and the development of specialized technology applications and operational support to meet national security missions.

Program Objectives

The objectives are to provide technical and analytical intelligence support to US efforts to:

- Improve nuclear materials protection, control, and accountability in the former Soviet Union.
- Assist in the safe and secure dismantlement of former Soviet nuclear weapons.
- Conclude a Fissile Materials Cut-off Treaty.
- Verify foreign compliance with international treaties and other commitments in the nuclear arena.
- Limit and redirect rogue nations' nuclear weapons programs.
- Address the challenge of global nuclear proliferation through the innovative and broad application of unique DOE capabilities.
- Help identify low probability/high impact scenarios in worldwide nuclear proliferation and weapons development.
- Facilitate the identification and transition of DOE technologies to meet near-term operational requirements of the Intelligence Community.
- Develop specialized technology applications to meet short-term national security requirements.
- Provide on-call, rapid response technical capabilities to support specialized operations.
- Support DOE policy development related to international terrorism and provide a conduit for timely, focused nuclear and nuclear-related intelligence reporting and assessments for US operations.

Performance Measures

Performance measures related to the Intelligence Program are qualitative rather than quantitative

- Provide advance warning of political or economic developments which have a high probability of producing energy supply disruptions
- Provide timely, detailed technical intelligence assessments and reporting that support Departmental, military, and Intelligence Community nuclear-related missions
- Maintain intelligence core capabilities at DOE's National Laboratories in nuclear weapons, nonproliferation, nuclear energy, safety, and waste, nuclear weapons science and technology; and fossil energy.
- Transition DOE technologies that meet near-term national security requirements from across the intelligence, special operations, and law enforcement communities
- Provide rapid identification and provision of unique DOE expertise and technologies to support US operations.
- Provide intelligence analysis of foreign nuclear weapons programs and related technologies and industries to help inform development of US policies on issues such as nuclear weapons dismantlement, fissile materials production and protection, and nonproliferation initiatives

Significant Accomplishments and Program Shifts

- Served as the lead analytical agency in various intelligence analyses.
- Based on an U.S Secret Service requirement, developed a prototype system for tagging and tracking vehicles. The tag is made up of a chemical compound that can easily be sprayed onto a target and has unique characteristics that generate several measurable signatures (e.g., UV absorption, UV fluorescence, and infrared fluorescence). When interrogated with a UV/IR light source, the tag can be detected with an optical sensing device
- Developed a prototype mobile, wireless, Intranet Protocol (IP)-based computer communications network that incorporates low probability of detection/low probability of intercept characteristics. The system provides a secure, flexible, mobile communications network that can support a variety of field operations.
- The Counterterrorism Analysis Cell was established to maintain an interface with the Intelligence Community, coordinate and obtain information on DOE intelligence requirements, support DOE policy development related to international terrorism, and provide a conduit for timely, focused nuclear and nuclear-related intelligence reporting and assessments for US operations.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Intelligence	34,500	36,059	–	36,059	36,059
Total, Intelligence	34,500	36,059	–	36,059	36,059

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Kansas City	370	370	370	0	0%
Los Alamos National Laboratory	4,977	4,977	4,977	0	0%
Pantex	275	275	275	0	0%
Sandia National Laboratories	4,475	4,475	4,475	0	0%
Chicago Operations Office					
Argonne National Laboratory	300	300	300	0	0%
Idaho Operations Office					
Idaho National Engineering Laboratory	700	700	700	0	0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	4,975	4,975	4,975	0	0%
Oak Ridge Operations Office					
Y-12 Site, Oak Ridge	2,015	2,015	2,015	0	0%
Richland Operations Office					
Pacific Northwest Laboratory	4,800	4,800	4,800	0	0%
Savannah River Operations Office					
Savannah River Technology Center	961	961	961	0	0%
Nevada Operations Office	3,300	3,300	3,300	0	0%
Office of Scientific & Technical Information	52	52	52	0	0%
Washington Headquarters	7,300	8,859	8,859	0	0%
Total Intelligence	34,500	36,059	36,059	0	0%

Site Description

Argonne National Laboratory

Argonne National Laboratory is one of the U.S Department of Energy's largest research centers It is also the nation's first national laboratory, chartered in 1946. Argonne occupies two sites. The Illinois site is about 25 miles southwest of Chicago's Loop. Argonne-West is about 50 miles west of Idaho Falls, Idaho It is the home of most of Argonne's major nuclear reactor research facilities. Argonne research falls into four broad categories. Basic science includes experimental and theoretical work in materials science, physics, chemistry, biology, high-energy physics, and mathematics and computer science, including high-performance computing. In the scientific facilities program, the laboratory designs, builds and operates sophisticated research facilities, such as the Advanced Photon Source, the Intense Pulsed Neutron Source, and the Argonne Tandem Linear Accelerator System, that would be too expensive for a single company or university to build and operate. For energy research, Argonne is developing advanced batteries, fuel cells, and electric power generation and storage systems. It is also working to improve the safety and longevity of both American and Soviet-designed nuclear reactors. Environmental management research includes alternative energy systems; environmental risk and economic impact assessments; hazardous waste site analysis and remediation planning; electrometallurgical treatment to prepare spent nuclear fuel for disposal; and new technologies for decontaminating and decommissioning aging nuclear reactors

Environmental Management and Enrichment Facilities

The Environmental Management and Enrichment Facilities (EMEF), formerly the K-25 Site, is managed by Bechtel Jacobs Company, Limited Liability Corporation (LLC) in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. The primary mission is to innovatively lead and cost-effectively manage programs in environmental remediation, waste management, technology development and demonstration, education and training, and technology transfer for DOE, other federal agencies, and the public. Specifically, EMEF manages the Toxic Substances Control Act (TSCA) Incinerator, a unique mixed waste treatment facility; the risk-based cleanup programs for contaminated facilities and natural resources that fully involved regulators and the public; the complaint and safe waste management at the DOE Oak Ridge Operations Office sites, including minimization, treatment, storage, and disposal for all programs and activities, the centers at the East Tennessee Technology Park (ETTP) that demonstrate advance environmental technologies, decontamination and decommissioning, and waste management; research, development, and demonstration of innovative technologies for environmental restoration and waste management leading to the most technically efficient and cost-effective programs; and ETTP services and facilities.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is located on 890 square miles in the southeastern Idaho desert. Other INEEL research and support facilities are located in nearby Idaho Falls. INEEL is home to the largest concentration of technical professionals in the northern Rocky Mountain region. Operated by Lockheed Martin Idaho Technologies Company for the U S. Department of Energy, it is the scene of some of the most advanced research programs in the world. Today, the INEEL is solving critical problems related to the environment, energy production and use, U.S. economic competitiveness, and national security. Application areas include, natural resource processing

and environmental management, spent nuclear fuel management, environmental technology development, mixed waste characterization and treatment, non- and counter-proliferation, advanced manufacturing, alternate energy supply and energy efficiency, and transportation technologies. The present mission of the INEEL is to develop, demonstrate, deploy, and transfer advanced engineering technology and systems to private industry to improve U S. competitiveness and security, the efficient production and use of energy, and the quality of life and the environment worldwide.

Kansas City Plant

The Kansas City Plant has been producing high quality electrical, mechanical, and engineered materials for weapons production since 1949. Owned by the Department of Energy and operated by Allied Signal Federal Manufacturing & Technologies, the Kansas City Plant offers a world-class technology base to industry and other government entities. Recently, it has been tasked by the Department of Energy to help American business compete by sharing our expertise In a time of transition and change, it is transferring its technology and know-how to private industry. In 1994, the 258,000 square-foot Technology Transfer Center opened at the Kansas City Plant. That same year the plant assumed management responsibilities for the Department of Energy's Kirtland Operations in Albuquerque, NM. That facility employs about 260 associates. Today, the Kansas City Plant employs about 3,300.

Lawrence Livermore National Laboratory

Lawrence Livermore is located in California's Lawrence Livermore is located in California's Tri-Valley region east of San Francisco The mission of the Lawrence Livermore National Laboratory (LLNL) is to apply science and technology in the national interest. LLNL's focus is on global security, global ecology, and bioscience. Its primary mission is to ensure that the nation's nuclear weapons remain safe, secure, and reliable and to prevent the spread and use of nuclear weapons worldwide. Livermore is the site for the National Ignition Facility, which will be the world's largest laser system and will provide the means for investigating the thermonuclear physics of weapons in the absence of nuclear testing and for exploring the promise of fusion energy. Livermore pursues projects aimed at significant, large-scale innovations in energy production to ensure abundant, clean, and affordable energy for the future. Environmental efforts will be directed at demonstrating effective remediation technologies, advancing the science base for environmental regulation, and modeling more accurately regional weather and global climate conditions. LLNL also serves as an effective national resource in the stewardship of nuclear materials The Laboratory's bioscience research will advance human health through efforts focused on genomics, disease susceptibility and prevention, and improved healthcare and medical biotechnology. Laboratory employees are working with industrial and academic partners to increase national economic competitiveness and improve science education.

Los Alamos National Laboratory

The Los Alamos laboratory, located with the town of Los Alamos approximately 35 miles northwest of Santa Fe, occupies 43 square miles of land in Northern New Mexico. Owned by the Department of Energy, Los Alamos has been managed by the University of California since 1943, when the Laboratory was born as part of the Manhattan Project to create the first atomic weapons during World War II. Los Alamos National Laboratory's central mission is reducing the danger of nuclear weapons and nuclear materials worldwide. Their statutory responsibility is the stewardship and management of the nuclear stockpile.

Reducing global nuclear danger involves five areas Stockpile stewardship ensures that the U.S has safe, secure, and reliable nuclear weapons Stockpile management provides capabilities ranging from dismantling to remanufacturing the stockpile. Nuclear materials management ensures the availability and safe disposition of plutonium, highly enriched uranium, and tritium. Nonproliferation and counterproliferation help to deter, detect and respond to the proliferation of weapons of mass destruction. Environmental stewardship provides for the remediation reduction of wastes from the nuclear weapons complex

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory, in Richland, Washington, is a United States Department of Energy multiprogram national laboratory operated by Battelle The total staff employment for 1996 was 3,326. The Laboratory focuses on research and development related to waste management, environmental restoration, global environmental change, energy and national security The Laboratory supports these areas with underlying technical capabilities, which integrate technical areas of expertise from many scientific disciplines Atmospheric Sciences, Biotechnology, Chemical Instrumentation and Analysis, Computer and Informational Sciences, Design and Manufacturing, Engineering, Ecological Science, Electronics and Sensors, Experimental Toxicology, Health Protection and Dosimetry, Hydrologic and Geologic Sciences, Marine Sciences, Materials Sciences and Engineering, Molecular Science, Nuclear Science and Engineering, Process Science and Engineering, Risk and Safety Analysis, Socio-Technical Systems Analysis, Statistics and Applied Mathematics, Thermal and Energy Systems. In addition, the Laboratory has an impressive catalogue of award-winning capabilities and technologies developed by its staff. The Environmental Molecular Sciences Laboratory (EMSL) is a new facility built to attain an understanding of the physical, chemical, and biological processes needed to solve critical environmental problems

Nevada Operations Office

DOE Nevada maintains the capability at the Nevada Test Site and other facilities and sites to implement DOE initiatives in stockpile stewardship, crisis management, waste management, environmental management, nondefense research and development, and work for others; as well as supporting other DOE programs. The HAZMAT Spill Center, located at Department of Energy's Nevada Test Site near Mercury, Nevada, is a unique, one-of-a-kind facility built to conduct hazardous materials testing and training under controlled conditions. A Joint Demilitarization Technology (JDT) Program has been established between the Departments of Defense and Energy. The JDT Program will demonstrate and validate environmentally acceptable technologies for resource recovery and recycling, alternative destruction, or treatment technologies as appropriate to excess stockpile and obsolete munitions. The Dipole Hail test program at the Nevada Test Site evaluates the functional disruption conventional high explosives have on underground activities Radioactive Waste Acceptance Program manages radioactive waste in a safe and compliant manner at the Nevada Test Site.

The Office of Scientific and Technical information

The Department of Energy (DOE) Office of Scientific and Technical Information (OSTI), operating from Oak Ridge, Tennessee, ensures overall stewardship and accessibility for the scientific and technical information (STI) generated and acquired by Department of Energy programs. With its annual research

and development budget of over $6 billion, the Department is a major U.S source of information derived from scientific and technical studies, work, or investigations which relate to research, development, and demonstration. OSTI supports the Department's and the Nation's energy goals related to basic and applied energy research, U.S. competitiveness, national security, and environment, safety, and health by providing information services to the Department, national laboratories, and other DOE contractors

Pantex Plant

Pantex is located 17 miles northeast of Amarillo, Texas. The Pantex Plant mission is to anticipate and satisfy U.S. Department of Energy (DOE) requirements by providing competitive, quality, on-time products and services that exceeds expectations and are achieved in a manner that protects the environment, ensures the safety and health of employees and the public, and protects our national security

Pantex Plant's primary mission is to: assemble nuclear weapons for the nation's stockpile; disassemble nuclear weapons being retired from the stockpile; evaluate, repair, and retrofit nuclear weapons in the stockpile; demilitarize and sanitize components from dismantled nuclear weapons; provide interim storage for plutonium pits from dismantled nuclear weapons; develop, fabricate, and test chemical explosives and explosive components for nuclear weapons; and to support DOE initiatives.

Sandia National Laboratory

The Sandia National Laboratory is operated for the U.S. Department of Energy by the Sandia Corporation, a Lockheed Martin Co. Starting in 1945 in Albuquerque, New Mexico, as part of the Manhattan Project, which built the first nuclear weapons, Sandia, today, has two primary facilities, one in Albuquerque and one in Livermore, California. It employs about 7,500 people and manages more than $1.2 billion of work per year. Scientist at Sandia design all non-nuclear components for the nation's nuclear weapons, perform a wide variety of energy research and development projects, and do assignments that respond to national security threats -- both military and economic. Sandia encourages and seeks with appropriate U.S. industry and government groups to collaborate on emerging technologies that supports its mission.

Savannah River Technology Center (SRTC)

The Savannah River Site (SRS) is a key Department of Energy (DOE) facility, focusing on national security work; economic development and technology transfer initiatives; and environmental and waste management activities. Owned by DOE and operated under contract by the Westinghouse Savannah River Company (WSRC), the complex covers 310 square miles, bordering the Savannah River between western South Carolina and Georgia for 27 miles. About 16,000 people are employed at SRS. The site's overall budget is about $1.6 billion. SRS was constructed during the early 1950s to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium-239. All five of the original SRS production reactors are permanently shut down. The future of SRS lies in three areas: reducing the nuclear danger; transferring applied environmental technology to government and non-government entities; and forming economic and industrial alliances.

Mission Supporting Goals and Objectives

Provide analysis and reporting on the status and direction of emerging nuclear weapons programs of proliferant nations; countries engaged in the supply of nuclear technology, equipment, and material to proliferant and established nuclear programs; the production and disposition of fissile material worldwide, with special emphasis on the implications of the breakup of the former Soviet Union and its impact on the control and accountability of special nuclear material in its possession; international terrorism for DOE policy makers, foreign nuclear weapons and nuclear related facilities/infrastructure, design, development, and employment of nuclear weapons, improvised nuclear and/or radiation dispersal devices, and illicit trafficking of related materials and components, the foreign economic threat to U.S. energy resources and U.S. energy security, the impact of changes in global energy and energy production markets on U.S. industrial competitiveness, while emphasizing opportunities and challenges to U.S. exports; the identification and characterization of foreign nuclear facilities posing a risk to human health and the environment; foreign technology plans, priorities, and commercial applications of leading edge technologies deemed critical by the Department and the White House Office of S&T Policy; and foreign dual-use technologies in Russia and China. Facilitate the transition of enabling technologies to meet near-term national security requirements within the intelligence, special operations, and law enforcement communities. Maintain an on-call capability to rapidly identify and provide technical support to agencies' varied missions and operations where unique DOE expertise/technologies may be of assistance. Maintain liaison throughout the community for the coordination of operational requirements, identification of applicable DOE technology, and formulation of appropriate investment strategies for developing new capabilities.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$Change	%Change
Intelligence	34,500	36,059	36,059	0	0%
Total, Intelligence	34,500	36,059	36,059	0	0%

Detailed Program Justification

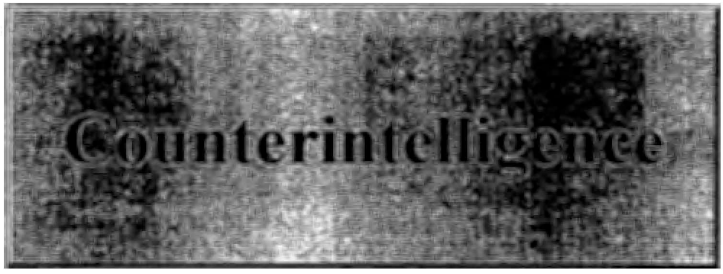
(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Provide analyses supporting U.S. Government policies in foreign material control and accountability. Provide technical evaluations of foreign nuclear dismantlement programs. Coordinate and obtain information on DOE intelligence requirements, support DOE policy development related to international terrorism, and provide a conduit for timely, focused nuclear and nuclear-related intelligence reporting/assessments for U.S. operations. Provide specialized technology applications and operational support to meet near-term national security requirements from the intelligence, special operations, and law enforcement communities. Provide salaries, benefits, travel, training, support service contracts, and other related expenses necessary to support the Office of Intelligence federal staff.	34,500	36,059	36,059

	FY 1998	FY 1999	FY 2000
Total, Intelligence	34,500	36,089	36,089

Explanation of Funding Changes from FY 1999 to FY 2000

There are no funding changes.


Counterintelligence

Counterintelligence

Executive Budget Summary

Mission

The Counterintelligence (CI) mission is to provide the Department of Energy (DOE), other U.S. Government policymakers, and the Intelligence Community (IC) with the capability to successfully identify, neutralize, and deter intelligence threats directed at the Department's facilities, personnel, information, and technologies.

The Department of Energy Counterintelligence Program is established in accordance with Presidential Decision Directive/NSC-61 (PDD-61), "U.S. Department of Energy Counterintelligence Program," dated February 11, 1998; Executive Order 12333, "U.S. Intelligence Activities", dated April 12, 1981; and, "The Atomic Energy Act of 1954, as amended." In accordance with PDD-61, the DOE Office of Counterintelligence (OCI) was established in March 1998. The Office of Counterintelligence is responsible for ensuring effective counterintelligence programs throughout the Department of Energy complex, including at the department's laboratories.

Strategy

The Department of Energy has long been and remains an attractive target for foreign intelligence services due to its substantial weapons and non-weapons related scientific expertise. Specifically, the Department's goal of technological superiority requires that DOE scientists interact with their international counterparts on a regular basis. This interaction, while essential, often results in concerns of a counterintelligence nature. Therefore, in order to protect against espionage and other threats, DOE established its own Counterintelligence Program in 1988.

Since its inception, the CI Program has been fraught with systemic problems. Several U.S. Government reports published over the past ten years, including two studies conducted by the General Accounting Office, one by the Federal Bureau of Investigation (FBI), and others by U.S. Intelligence Community (USIC) groupings, concluded that the Department was not doing enough to adequately protect its property and personnel against the collection activities of foreign intelligence services. These reports resulted in the signing of PDD-61 which galvanized senior level USIC and Departmental interest in the Department's CI Program. The PDD mandated numerous changes to DOE's CI Program, addressing for the first time the structural flaws identified in the aforementioned U.S. Government reports.

In response to the requirements of PDD-61, Secretary of Energy Peña reorganized the CI activities of the Department, creating an independent Office of Counterintelligence that reports

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directly to the Secretary of Energy, as apposed to sub-elemental function reporting to the Director of the Office of Nonproliferation and National Security. Mr. Edward J. Curran, a senior Foreign Counterintelligence Official at the FBI was appointed as Director of the Office of Counterintelligence. Pursuant to PDD-61, the Department is in the process of making significant improvements to its CI Program.

Major Changes

The Department's newly established OCI published a classified report 90 days after the PDD was signed. The report was based on three months of field research and subsequent analysis by professional counterintelligence officers from the USIC, and set forth 46 specific and substantive recommendations aimed at strengthening the Department's CI Program. The majority of the recommendations were aimed at creating a more centralized Program, with the resources necessary to carry out the analytical, investigative, personnel security, information security, and training aspects of OCI's mission. Specifically, the report's major findings focus on: 1) Accountability of Laboratory Directors for CI activities at their locations; 2) Organization and management of the CI Program; 3) Security Programs that support the CI mission; 4) Weaknesses in the Foreign Visits and Assignments Program; 5) The Counterintelligence-Cyber threat; and 5) FBI and Intelligence Community relationships. As the direct result of the report findings, DOE has requested from the Congress a significant increase in the fiscal year 1999 and 2000 budget for counterintelligence activities. The requested levels provide for mission essential counterintelligence analyses, debriefings, training, information technology, and counterintelligence inspections throughout the DOE Complex. The report and its recommendations were endorsed by Secretary Richardson in November 1998 and the Department has recently begun implementing these recommendations.

The Department's conduct of highly advanced research and development activities ensures that it will always be a target for foreign intelligence services. With the implementation of the report recommendations and establishment of an aggressive CI Program at the Department of Energy, the Department's personnel and sensitive technologies will be much less vulnerable to future exploitation by foreign intelligence services. The new Office of Counterintelligence provides the first ever centrally managed Counterintelligence Program within DOE, including mission essential counterintelligence analyses, debriefings, training, information technology, and counterintelligence inspections throughout the Complex.

Edward J. Curran

Edward J. Curran

Date 1/21/99

Counterintelligence

Program Mission

The mission of the Office of Counterintelligence is to develop and implement an effective Counterintelligence Program throughout the Department of Energy whose goal is to identify, neutralize and deter foreign government or industrial intelligence activities directed at or involving DOE programs, personnel, facilities, technologies, classified information and unclassified sensitive information. The DOE CI Program is established in accordance with PDD-61; Executive Order 12333, "U.S. Intelligence Activities", dated April 12, 1981; and, "The Atomic Energy Act of 1954, as amended." The DOE OCI is responsible for approving, conducting, and coordinating all policy and investigative matters with the FBI at Headquarters and the Field. OCI's relationship with the FBI is defined by: Executive Order 12333, PDD-61; Director of Intelligence Directive 5/1; Section 811 (c) of the Intelligence Authorization Act of 1995, and the "Memorandum of Understanding between the Department of Energy and the FBI", dated October 7, 1992.

Program Goal

The goal of the Counterintelligence Program is to enhance the protection of sensitive technologies, information, and expertise against foreign intelligence, industrial intelligence, and terrorist attempts to acquire nuclear weapons information or advanced technologies from the National Laboratories.

Program Objectives

The Director of the Office of Counterintelligence will direct five core Departmental wide policy and programmatic components from Headquarters to include the Counterintelligence Analysis Program; the Counterintelligence Investigations Program; the Counterintelligence Evaluation Board/Security; the Counterintelligence Inspections Program; and the Counterintelligence Training Program. All Headquarters and Field counterintelligence activities are directed by the Director of the Office of Counterintelligence.

- The CI Analysis Program is predicated on the findings of multiple US Government studies on DOE that state that there is currently a dearth of strategic, value-added analysis to support DOE's counterintelligence efforts and that such analysis is an essential element of an effective program. These studies found that DOE Counterintelligence Officers (CIOs) in the field have little time to dedicate to such analysis, and that they are not well positioned to exploit the collective knowledge of the USIC or the cumulation of raw data generated by the various national laboratories.

- The CI Investigations Program mission is to develop and implement an effective defensive counterintelligence investigative program throughout the Department. The

Program focus is to detect and neutralize foreign government or industrial intelligence activities in the United States directed at, or involving, DOE programs, facilities, technology, personnel, unclassified sensitive information and classified information.

- The CI Evaluations Board will conduct comprehensive security and counterintelligence vetting of all DOE personnel assigned to Special Access Programs, Personnel Assurance Programs, and Personal Security and Assurance Programs to include financial disclosure and polygraph.
- The CI Inspections Program will ensure the adherence of Departmental elements to PDD-61 and other existing requirements.
- The Training Program will establish the criteria for and ensure the professional training of Counterintelligence Officers throughout DOE.

Funding Profile

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Counterintelligence	7,641	15,641	0	15,641	18,641
Contribution from labs	0	0	0	0	12,559
Total, Program Level	7,641	15,641	0	15,641	31,200

Budget Request

The FY 2000 budget request for the Office of Counterintelligence is $18.641 million. The Department plans to supplement that funding with an additional $12.559 million that will be obligated to the national laboratories from other DOE defense programs, but spent under the direction of the Director of the new Office of Counterintelligence. Thus, the requested program level for the new Office is $31.2 million. The FY 2000 budget provides for mission essential counterintelligence analyses, debriefings, training, information technology, and counterintelligence inspections throughout the DOE Complex, all of which are necessary and mandated by PDD-61 for the Department to have an aggressive Counterintelligence Program. The $31.2 million program level enables the Director of the Office of Counterintelligence to meet the requirements of PDD-61 by ensuring the establishment of and programmatic functionality of the Department's Counterintelligence analysis program; inspection program; training program; financial disclosure program; and polygraph program, as well as enhancing the Counterintelligence personnel at the Department's Laboratories.

Worker and Community Transition

Worker and Community Transition

Program Mission

The Office of Worker and Community Transition was formed in September 1994 to mitigate the impacts on workers and communities caused by changing Department of Energy (DOE) missions, consistent with Section 3161 of the Defense Authorization Act of 1993. The Department will continue to experience restructuring of its contractor work force in Fiscal Year 1999 and beyond. These adjustments will be driven by changes in the management of the strategic stockpile and shifts in skill mix requirements. Changes in contracting mechanisms will also involve significant employment adjustments beyond net reductions in total DOE contractor employment.

The Office of Worker and Community Transition has been and will continue to be a major management tool for streamlining the Department of Energy yet maintaining effectiveness during a major downsizing activity that began in FY 1993. During that time, the Office has developed the expertise to oversee work force planning for the Department, assist in developing benefits packages for displaced workers, oversee labor relations efforts, lessen the impact of downsizing on affected workers and communities by fostering alternative employment opportunities, and integrate asset disposition, where possible, into community transition efforts. Through the actions of this Office, significant cost savings have been realized, far exceeding the amount spent on the entire program. By helping the sites expeditiously separate workers, large quantities of payroll costs have been saved. By transferring property to local authorities as part of the community transition program, the Department has been able to save millions of dollars in operating costs and projects currently planned will produce more savings. The Mound Facility is an example of the future savings that are possible. Expedited closure made possible through the community transition program will save the Department $150 - $200 million in operating costs.

Consistent with the Department's initiatives to promote best business practices, guidance for work force restructuring at DOE sites reflects lessons learned in the private sector, including the use of comprehensive work force planning. Private companies increasingly undertake work force restructuring strategies similar to those adopted by the Department. For example, a March 1995 report by the General Accounting Office surveying 25 major companies, including firms with considerable federal contracting such as General Electric, Grumman and Honeywell, experiencing work force restructuring, found that "at least 18 (72%) provided various incentives to encourage employees to voluntarily leave." These included early retirement, lump sum incentive payments, tuition, medical benefits and outplacement assistance similar to those provided at DOE sites. A survey conducted by Actuarial Sciences Associates, Inc., of mid-1990s downsizing practices of 60 major companies "confirm that it is common for employers that wish to downsize first to offer either an exit incentive retirement or resignation program (or sometimes both sequentially), and only then to utilize layoffs to the extent downsizing is still needed. This, indeed, is *the* classic exit incentive strategy and it is probably motivated more by the desire to be humane and to preserve employee morale." Further, worker insecurity about their treatment in the event of additional work force changes often severely decreases productivity among remaining workers.

The Department, however, is motivated by more than the desire to emulate the best business practices of the private sector. Regardless of the employer — whether it is public or private — major decreases in regional work force have negative economic and social effects. The economic effects include both the obvious lost individual income and tax revenue as well as the secondary impacts, as disposable income decreases within the community, of corresponding decreases in businesses that supported the affected workers. Social effects have been observed for individual workers — including those who remain as well as those who leave — and the community in which they live. Increases in social problems, e.g., substance abuse, spousal abuse and suicide, have been shown to increase in communities where large numbers of job layoffs are occurring.

While private companies may use work force change strategies similar to those of the Department, those measures may only partially mitigate the impacts mentioned above, especially if replacement jobs are not available. Private companies are free to leave to the community and other Federal, state, and local units of government the responsibility of bearing the remaining economic and social costs if replacement jobs are not available, although the employer must endure the loss of productivity caused by workers' uncertainty about the future. The Federal government, as simultaneously the employer, provider of many social services, and recipient of tax revenue, has a comprehensive interest in decreasing the cumulative economic and social impacts caused by significant changes in its funded work force. Community transition assistance helps attract or retain job opportunities which can: (1) decrease the loss of individual income, tax revenue, and secondary job losses; (2) decrease the social problems and the corresponding cost of social services (borne by other Federal agencies and state and local units of government) caused by DOE work force restructuring, and; (3) help to develop alternative employment which would contribute to maintaining productivity in remaining workers by providing confidence that other employment opportunities will be available in the event of further downsizing.

The Worker and Community Transition budget provides funding for activities associated with enhanced benefits beyond those required by contract, existing company policy or collective bargaining agreements at defense nuclear facilities, and is part of the overall Department's Other Defense Activities budget request. In addition, Congress has identified this appropriation as the only authorized source of funding for local impact assistance to communities affected by work force reductions at defense nuclear facilities.

The Office of Worker and Community Transition coordinates policy direction and implementation for field operations involving work force planning, restructuring, labor standards and relations, community transition activities, and asset management across the Department. This program also provides for the personal and contractual services for all federal management, and administrative personnel to carry out the Worker and Community Transition mission including related costs such as space, materials, utility, supplies, communication and building maintenance at DOE Headquarters.

During Fiscal Year 1997, the functions of the Office of Asset Management were added to those of the Office of Worker and Community Transition. This was done because asset management implementation actions are focusing on pilot project proposals, such as recovery of precious metals from weapons components and electronic scrap recycling and use, which are designed to provide a financial return to the Federal government through the disposition of the assets as well as stimulating regional and local economic development. Because asset disposition and stimulating economic development can conflict or complement each other, dependent upon the coordination between the two programs and the

individual circumstances of each case, the combination of the two programs is expected to reduce the conflicts and increase the benefits of asset disposition.

A further integration of asset management and community transition involves re-industrialization. This activity locates excess Department of Energy facilities and equipment that must be maintained, with the cost of maintenance accruing to the Department. In the reindustrialization process, businesses are recruited to make use of these excess Department of Energy facilities and equipment. As part of the terms for the use of the Department's assets, the private businesses will assume maintenance responsibilities. The Department would then receive a return on its investment in the assets as well as be relieved of the cost of asset maintenance. At the same time, private industry is making use of former Department equipment to produce goods and services and provide jobs located in affected communities. Further, workers who had been affected by work force restructuring should be highly competitive for jobs operating that equipment.

Through its programs, the Office of Worker and Community Transition is contributing to achieving Objective CM-3 of the September 1997 Strategic Plan for the Department of Energy. That objective stated that the Department would, "Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs, improve the delivery of products and services, and evaluate performance."

Program Goals

- Mitigate the impacts on workers and communities from contractor work force restructuring at defense sites, and assist community planning for all site conversions, while humanely and cost-effectively managing the transition to the reduced work force that will better meet ongoing mission requirements through the application of best business practices.
- Reduce the cost of managing the Department of Energy inventory of underutilized assets through the application of private sector business principles to the Department's asset disposition efforts.

Program Objectives

- *To facilitate work force planning by Department contractors* — develop a process and tools for projecting contractor work force requirements at each site on the basis of mission, budget estimates, and work force skills, to assure that priority missions can be accomplished safely and efficiently.
- *To restructure the Department of Energy contractor work force* — establish work force restructuring policy, coordinate and implement work force restructuring, and evaluate the outcomes of work force restructuring plans consistent with section 3161 of the National Defense Authorization Act for Fiscal Year 1993, the contract reform initiative, and other Departmental policies.
- *To provide fair treatment to workers who must be displaced throughout the Department* — within budget constraints, provide benefits to affected workers, such as: incentives or other options to minimize involuntary layoffs; adequate advanced notification; retraining for other employment and

rehiring preference to displaced workers where practicable; relocation assistance and outplacement assistance; and local community impact assistance, consistent with best business practices.

- *To manage contractor labor relations* — establish policy for contractor labor relations, oversee the collective bargaining process, and assist field organizations in labor/management relations.
- *To assist community transition* — develop policies for community transition, and assist communities affected by Departmental changes by facilitating their economic development planning and plan implementation activities to produce alternative replacement employment sources in affected communities.
- *To identify and dispose of assets that are excess or unneeded for current Department missions* — develop asset inventory procedures, develop and implement pilot projects designed to accelerate asset dispositions, establish a DOE-wide asset management recovery and disposition program, and work with field and program managers to develop cost-effective methods for asset disposition.

Performance Measures

- Through effective work force planning, the number of jobs vacated through incentivized and non-retirement separations that have to be filled by employees from outside the DOE complex will be 2 percent or less.
- Limit involuntary separations to 60 percent of all separations while assuring maintenance of the essential work force skills mix.
- At least 60 percent of separated workers seeking new jobs are reemployed within two years of separation.
- Manage gross adjustments in the contractor work force affecting an estimated 3,000 to 5,000 workers in FY 2000. Provide separation benefits at an average cost per separated worker of less than $25,000 (basic separation costs would be paid by the affected program and enhanced benefits would be paid by the worker transition program). Overall reductions in the work force are estimated to be approximately 2,000 positions.
- Achieve annual cost savings from compensation for separated workers that is at least three times the one-time cost of separation.
- Through community assistance, create or retain about 1,700 jobs in FY 2000. Maintain the average cost per job at less than $10,000. The cumulative number of jobs created or retained will be 15,000 - 20,000 by the end of FY 1999 and 20,000 - 30,000 by the end of FY 2000.
- Twenty-five collective bargaining agreements are renegotiated or renewed with no unresolved labor-management disputes.
- Implement initiatives to accelerate asset conversion and reuse that will result in more than $1 billion in long-term savings to the Department and facilitate economic diversification of local communities.

Significant Accomplishments and Program Shifts

- At the Mound Facility, an agreement to expedite the plant closure was completed. Dependent upon appropriations, funding will be provided that will allow the Department to close and dispose of the plant three years earlier than planned and save between $150 - 200 million in operating costs.
- The program successfully managed the reduction of about 46,000 contractor personnel in six years (Fiscal Year 1993 - 1998).
- Nearly two thirds of separations to-date have been voluntary, with an average (including workers separated through attrition) separation cost of approximately $18,000 per position. When attrition is excluded, average separation costs have been approximately $23,000.
- Based on the average cost per contractor worker, total annual recurring savings to-date for the 46,000 prime contractor positions eliminated is in excess of $3.3 billion for salaries and benefits.
- Utilized the Community College Network Program (C2Net) to tailor new retraining programs for displaced workers at sites, such as, Portsmouth, Ohio, Grand Junction, Colorado, and Amarillo, Texas.
- Used oversight and intervention to forestall or resolve serious conflicts in labor and management relations at Pantex, Argonne, Mound, Los Alamos, and Fernald.
- Provided local impact assistance to affected communities that cumulatively created or retained over 16,000 private sector jobs through the end of FY 1998, with an anticipated additional 17,000 jobs by the end of the year 2001. One job has been created or retained to date for each $9,500 provided to affected communities by the program. This figure compares favorably with the experience of other Federal agencies in similar efforts.
- Achieved $ 32.89 million in total proceeds returned to the Treasury through the completed Asset Sales Initiative.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Worker and Community Transition					
Worker and Community Transition	57,659	26,000	0	26,000	26,500
Program Direction	3,500	3,900	0	3,000	3,500
Subtotal, Worker and Community Transition	61,159	29,900	0	29,900	30,000
Use of Prior-Year Balances[a]	-11	-1,698	0	-1,698	0
Total, Worker and Community Transition	61,148	28,202	0	28,202	30,000

Public Law Authorization:

Public Law 102-484, "National Defense Authorization Act for Fiscal Year 1993," Section 3161

[a]Office of Worker and Community Transition portion of Other Defense Activities reductions for use of prior-year balances

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Kansas City	7,000	0	0	0	0.0%
Los Alamos National Laboratory	5,600	0	0	0	0.0%
Pantex	300	200	0	-200	-100.0%
Sandia	650	0	0	0	0.0%
Total, Albuquerque Operations Office	13,550	200	0	-200	-100.0%
Headquarters	4,196[a]	3,987[b]	15,500[c]	+11,513	288.8%
Idaho Operations Office	6,000	6,863	6,000	-863	-12.6%
Nevada Operations Office	5,000	0	0	0	0.0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	150	0	0	0	0.0%
Ohio Field Office					
Fernald Area Office	262	1,000	1,000	0	0.0%
Mound Area Office	0	5,000	5,000	0	0.0%
Total, Ohio Field Office	262	6,000	6,000	0	0.0%
Oak Ridge Operations Office					
Oak Ridge Operations Office	10,600	2,800	1,500	-1,300	-46.4%
Paducah Site Office[d]	400	0	0	0	0.0%
Portsmouth Site Office[d]	6,100	0	0	0	0.0%
Total, Oak Ridge Operations Office	17,100	2,800	1,500	-1,300	-46.4%
Richland Operations Office	3,880	6,000	1,000	-5,000	-83.3%
Rocky Flats Field Office	6,271	2,500	0	-2,500	-100.0%
Savannah River Operations Office	4,750	1,550	0	-1,550	-100.0%
Subtotal, Worker and Community Transition	61,159	29,900	30,000	+100	0.3%
Use of prior year balances	-11	-1,698	0	0	0.0%
Total, Worker and Community Transition	61,148	28,202	30,000	+1,798	6.4%

[a]Includes $3,500,000 Program Direction costs and $1,247,000 not allocated during FY 1998

[b]Includes $3,900,000 Program Direction costs.

[c]Includes $3,500,000 Program Direction costs and $14,500,000 not designated at this time.

[d]An additional $20,000,000 in a reimbursable account established by United States Enrichment Corporation (USEC) for worker and community transition activities is not included in this table for FY 1999 and FY 2000. The funds are designated for Paducah and Portsmouth which are administered by the Oak Ridge Operations Office.

Site Description

Kansas City Field Office

The Kansas City Field Office is a former weapons facility that experienced a significant down-sizing in FY 1998. Funding was provided during that fiscal year for work force restructuring. But, because of the size and relative health of the Kansas City economy, no community transition funding was requested.

Los Alamos National Laboratory

The Los Alamos National Laboratory has experienced significant work force adjustments in past fiscal years. Because of its isolated location, the Laboratory has constituted a significant portion of the local economy. Worker transition funding was provided to satisfy current needs for worker benefits: Community transition funding has been provided to assist the local community in diversifying their economic base while taking advantage of the human resources of the facility. At this time, the community reuse organization is not expecting a need during FY 1999 or FY 2000. However, their estimate may change depending upon events that occur in the future.

Pantex Plant

The Pantex Plant is located in Amarillo, Texas, and has been dismantling nuclear weapons. Worker transition funding has been provided to satisfy the existing need to pay worker benefits. Community transition funding has been provided to assist the affected community in the planning to diversify their economy. Although their planning has not yet progressed to the point that they are prepared to estimate a need for community assistance, the CRO may request community transition funding in the future, possibly during FY 1999 or FY 2000.

Sandia National Laboratory

Worker transition funding was provided to the Sandia Laboratory in order to satisfy the benefit payments of workers. Community transition funding was provided to help the affected community plan to diversify the local economy. Those planning efforts are not yet completed. Therefore, the CRO for the Sandia Laboratory may later request funding for FY 1999 and/or FY 2000.

Headquarters

Any funding which has not been committed is reserved at headquarters. Since the work force restructuring is counter-cyclic, i.e., it has the greatest activity when other budgets are decreasing and vice versa. Until the other program budgets are known, it is not possible to estimate where work force restructuring funding will be needed. Estimates have been made for FY 1999 based upon appropriations for other programs. However, the majority of the work force restructuring funding for FY 2000 is now

shown as being at Headquarters because the sites that will be experiencing work force restructuring are unknown at present.

Community transition is also counter-cyclic but is a longer-term process which enables better estimates of anticipated needs. Funding allocations in this program depend upon the submission of adequate proposals from the local community. Although estimates of funding have been made for FY 2000, the allocation of estimated funding among sites will depend upon the relative merits of program proposals not yet submitted and the local communities' management of their respective programs. Since both of these factors are currently unknown, many of these estimates are subject to change.

Idaho Operations Office

The funding for the Idaho Operations Office is primarily to satisfy the Department's obligations under a legal settlement for the nuclear spent fuels program. Under that settlement, the Department agreed to provide $30 million to the State of Idaho over five calendar years, dependent upon appropriations being adequate. The Department made the first payment of $3 million in FY 1996 followed by $6 million in successive fiscal years. Funding will be complete with a $3 million payment to be made in FY 2001 (calendar year 2000).

Nevada Operations Office

The funding for the Nevada Operations Office was provided to the CRO to diversify the regional economy to develop replacement industry that can utilize the skills of the workers affected by downsizing. During FY 1998, the Department provided funding for a set of projects totaling $5 million. The CRO does not expect to request additional funding during FY 1999 or FY 2000 but changing circumstances could cause them to revise their estimates.

Lawrence Livermore National Laboratory

Work force restructuring assistance was provided to the Lawrence Livermore Laboratory to satisfy the need for benefits for workers affected by downsizing. At this time, no funding needs are estimated for FY 1999 or FY 2000.

Fernald National Laboratory

The Fernald Laboratory has only recently experienced work force restructuring. Therefore, the need to develop alternative employment in a diversified economy had not previously been a concern. With recent work force restructuring actions and the intention to completely close and demolish the facility in the future, replacement employment has become important. Because reindustrialization of the site will not be possible, all new employment opportunities will need to come from hiring outside the Fernald facility at other businesses in the community or new businesses that open. The funding for FY 1999 and FY 2000 is for the purpose of creating or maintaining jobs within the Fernald Laboratory community.

Mound Area Office

The FY 1999 and FY 2000 funding for the Mound Facility is to honor the Department's commitment, contingent upon appropriations, to accelerate the transfer of the entire facility out of the Department's ownership. The local community reuse organization would then use the facility to attract replacement industry to employ former workers. The Department would experience significant savings of $150 - 200 million since it would be saved having to pay operating costs three years earlier than previously planned.

Oak Ridge Operations Office

The funding for the Oak Ridge office includes both worker and community transition funding. The work force restructuring funding included more than $2 million in FY 1998 to pay the benefits of workers affected by downsizing. The FY 1999 budget includes an additional $2 million for such purposes with up to 1000 workers estimated to be affected by restructuring during FY 1999. The community transition funds are to assist in attracting replacement industries for this latest group of displaced workers. An important element of the replacement industries is the reindustrialization program. This program consists of an effort to attract industries that can use excess Department of Energy facilities and equipment. The reindustrialization program will reduce the Department's maintenance costs as well as provide similar employment using familiar equipment for former workers.

Paducah Site Office

On June 30, 1998, the United States Enrichment Corporation (USEC) signed a two-year agreement with the Department to provide $20 million reimbursable account for work force restructuring and community transition activities similar to those at other sites. The $20 million will provide for the expected cost of work force restructuring and a portion of the expected costs for community transition. The funding would be shared with the Portsmouth facility.

The funding within FY 1999 and FY 2000 will be from the USEC account. If funds become available, some other allocations for community transition may be possible.

Portsmouth Site Office

On June 30, 1998, the United States Enrichment Corporation (USEC) signed a two-year agreement with the Department to provide $20 million in a reimbursable account for work force restructuring and community transition activities similar to those at other sites. The $20 million will provide for the expected cost of work force restructuring and a significant portion of the expected costs for community transition. The funding would be shared with the Paducah facility.

The funding within FY 1999 and FY 2000 will be from the USEC account. If funds become available, some other allocations for community transition may be possible.

Richland Operations Office

The funding for the Richland Office includes $2 million for work force restructuring activities during FY 1999 to provide enhanced benefits for up to 1000 workers affected by restructuring activities. The estimated needs for community transition is $4 million in FY 1999 and up to $5 million could be provided in FY 2000. This funding will assist the local community reuse organization in further diversifying the economy. An important element of the effort to diversify the economy includes reindustrialization of the Hanford site. In this program, the CRO seeks to attract industries that can use excess Department of Energy facilities and equipment. The reindustrialization program will reduce the Department's maintenance costs as well as provide similar employment using familiar equipment for former workers.

Rocky Flats Office

The Rocky Flats Office experienced a work force downsizing in FY 1998 that required the use of almost $5 million of the funding indicated for that year. The balance of the funding was for the community reuse organization to assist in diversifying the local economy. During FY 1999, the estimated need is for funding for enhanced benefits for about 500 - 700 workers. At this time, the CRO has not estimated any need for community transition funding. However, circumstances may change and funding may be requested at some time in the future.

Savannah River Operations Office

Most of the funding for the Savannah River Operations Office is for work force restructuring activities. The balance is for community transition. However, circumstances may change and additional community transition funding may be needed.

Worker and Community Transition

Mission Supporting Goals and Objectives

The activities of the work force restructuring program establish policy for, coordinate implementation of, and evaluate the outcomes of work force restructuring consistent with section 3161 of the National Defense Authorization Act for Fiscal Year 1993, the contract reform initiative, best business practices and other Departmental policies as well as Objectives CM-2 and CM-3 of the Strategic Plan. The functions of the work force restructuring program include providing guidance to DOE field management for developing work force restructuring plans; assuring adequate advance notification for planned reductions; reviewing and approving voluntary incentive programs to encourage workers with redundant skills to separate; reviewing draft work force restructuring plans prior to circulation for stakeholder review and comment; approving necessary involuntary separations; providing enhanced benefits to former defense program contractor employees being separated; and submitting final work force restructuring plans to the Congress. Based on Secretarial direction, work force restructuring objectives are considered for reductions that exceed a threshold of 100 workers at any site, including those not specifically covered by section 3161, in a single year. This activity assures that necessary work force reductions are conducted in a manner that encourages voluntary separations, assists displaced workers in securing new employment, provides basic benefits for a reasonable transition period, and is consistent with cost guidance and best business practices. The activity makes critical priority decisions to match these objectives with fiscal constraints.

Work force planning assures that contractor work force restructuring is conducted in a manner that assures that critical skills for ongoing mission requirements are retained, enhances efficiency, and accurately forecasts mission performance implications of potential future budget reductions. This goal is being achieved through the development of an integrated work force planning process based on a uniform work force data base and classification system for Department contractor employment. It supports the Departmental objective of realigning efforts to areas of maximum efficiency without jeopardizing critical task assignments.

Management of contractor labor relations establishes policy for such activities, oversees the collective bargaining process, and assists field organizations in labor/management relations. These activities promote an improved working relationship between labor and management in the Department's contractor work force. The result is uniform application of relevant labor standards, increased productivity, enhanced safety and security, and a reduction in disruptive labor disputes. The function also helps to implement the contract reform initiative, outsourcing policy and other elements of strategic alignment.

Section 3161 of the FY 1993 Defense Authorization Act establishes an objective for the Department to "provide local impact assistance to communities that are affected by the restructuring plan" and to coordinate such assistance with other federal programs. This activity also provides an informational clearinghouse to assist local community economic development planning; identifies potential sources of both public and private funding outside the Department; and, on a high priority basis, funds projects that have a high probability of producing positive results for displaced workers and their affected communities. The Office has established criteria for evaluating community transition funding proposals and has signed an interagency agreement with the Department of Commerce to utilize its independent

expertise to evaluate and approve proposals. The Department, in close cooperation with parties in the affected communities, also seeks to utilize excess Departmental assets to help create economic activity and produce replacement employment for workers displaced by work force restructuring plans.

The mission of the asset management program is to develop a corporate strategy for the disposition of materials and assets in response to new missions for the Department along with a declining budget and resultant reductions both in the number of persons employed by the Department of Energy and the size of the physical plant. Elements of the strategy include the development of guidance and managing the implementation of the asset management program, assisting program managers in reducing the real and personal property holdings of the Department and in responding to new Departmental missions. The program is also developing procedures for asset sales and transfers, leasing and donation procedures, and material and asset management programs in field and program offices. Asset management program implementation actions now are focusing on pilot project proposals, such as recovery of precious metals from weapons components, electronic scrap recycling and reuse, sale of heavy water, facilities reuse, and the disposition of unneeded assets, which are designed to provide a financial return to the Federal government while reducing the overhead expenses of the Department through the disposition of the assets as well as stimulating regional and local economic development. The funding for the asset management program is included in program direction.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000[a]	$ Change	% Change
Work Force Restructuring	18,054	9,400	9,400	0	0.0%
Community Transition Assistance	39,605	16,600	17,100	+500	3.0%
Total, Worker and Community Transition	57,659	26,000	26,500	+500	1.9%

[a]FY 2000 estimates are preliminary. Because the Worker and Community Transition Program is counter-cyclic, more exact estimates will depend on other program funding during FY 2000.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Work Force Restructuring			
Reviewed and approved work force restructuring actions affecting about 3,000 prime contractor positions during FY 1998. Review and approve work force restructuring plans and actions that could affect 3,000 to 5,000 workers in both FY 1999 and FY 2000, based on currently projected Departmental activities. Affected sites — as accurately as they can be determined at present — are addressed in the discussion of site funding. Through language in the FY 1998 appropriations legislation, funding under authority of Sec. 3161 provides only for the enhanced benefits of separations.			
The funding shown does not include the enhanced benefits for workers at the gaseous diffusion plants at Paducah and Portsmouth until after June 30, 2000. Up to that date, those benefits will be paid from a reimbursable account provided by the United States Enrichment Corporation (USEC).			
Coordinate work force planning activities to retain critically needed skills to meet ongoing missions in the face of an additional adjustments in the contractor work force (on top of the 29% reduction that has occurred between FY 1994-97), and to review and fund requests for enhanced separation benefits from field offices.			
Continue to assist field offices in maintaining early and open communication between labor unions and management and in the conduct of negotiations.			
The elements of work force planning and labor negotiations will impact the achievement of the performance measures discussed earlier. For work force restructuring, the measures include outside hiring levels, number of involuntary separations, reemployment of workers, and reducing the size of the work force while keeping separation payments within a target level.			
The proposed level of funding considered both the estimated number of workers to be separated and the individual cost of each worker	18,054	9,400	9,400
Total, Work Force Restructuring	18,054	9,400	9,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Community Transition Assistance			
Approved community transition projects which have created or retained approximately 16,000 jobs as of the end of FY 1998. About 3,300 of the jobs created or retained resulted from FY 1998 funding. Additional funding is expected to create about 550 jobs in FY 1999, and 350 in FY 2000. (See also jobs created in the State of Idaho and at the Mound Facility, discussed below)	33,605	5,600	6,100
Under the terms of a legal settlement with the State of Idaho, the Department is committed to provide a total of $30 million over the calendar years 1996 - 2000, contingent upon appropriations, to the State of Idaho. This funding is expected to create about 600 jobs per year.	6,000	6,000	6,000
At the Mound Facility, the Department has committed to providing $15 million over three years, contingent upon appropriations, to accelerate the reuse of the site following its sale. The funds would be used in conjunction with other grants to perform site improvement work which would make the Mound Facility more marketable. This funding is expected to create a total of about 1,500 jobs, with about 500 jobs each fiscal year to result from the funding. The Department would save $150 - 200 million by this early closure because it could stop paying the operating costs three years earlier than had been planned.	0	5,000	5,000
Total, Community Transition Assistance	39,605	16,600	17,100
Total, Worker and Community Transition	57,659	26,000	26,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Community Transition Assistance	
■ If the funding required for work force restructuring activity is less than what is presently assumed, the Department would propose to make the difference available for community transition	+500
Total Funding Change, Worker and Community Transition	+500

Worker and Community Transition Program Direction

Mission Supporting Goals and Objectives

Program direction provides funding for administrative support to ensure that all operations are conducted in the most effective and efficient manner. This element also provides for the personnel and contractual services of all federal management and administrative personnel to carry out the missions of the Office of Worker and Community Transition at Department of Energy Headquarters and Field Offices.

Program direction has been grouped into four categories:

Salaries and Benefits provides for all the salaries, other benefits, e.g., employer contribution to retirement, employer contribution to health benefits and awards for superior service. The employees funded by this category perform strategic planning for the program, integrate internal and external policies and directives; represent the Office both within and outside the Department; provide technical direction and guidance for programs and projects; perform program assessment; and exercise internal controls.

Travel is provided for the traveling and per diem expenses of program staff in the performance of their official duties. Under certain circumstances, travel expenses of non-government personnel or government personnel from other programs may be compensated if they are serving a mission of the Office. Specifically, staff travel to affected communities to provide technical and program assistance to field offices, contractor employees, and community representatives and conduct program assessments. They also participate in meetings, conferences, and training selected to increase their professional expertise and program effectiveness.

Support Services for the Office of Worker and Community Transition consists of the payment for management support services of non-government personnel. These personnel assist the staff of the Office of Worker and Community Transition in accomplishing their missions by providing technical support, performing or assisting in program analyses, and assisting in the subsequent preparation of reports. The support services personnel also provide general program management functional support.

Other Related Expenses includes the necessary materials, services, utilities, and office space needed to conduct the program in an efficient manner. The major portion of this category consists of the items included in the working capital fund. This working capital fund includes such items as, office space; telephones; printing and duplicating services; and computer network connections and technical support. The other portion of other expenses includes procurement of supplies for the conduct of office functions.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salaries and Benefits	2,128	2,302	2,250	-52	-2.3%
Travel	75	85	85	0	0.0%
Support Services	776	932	572	-360	-38.6%
Other Related Expenses	521	581	593	+12	+2.1%
Total, Program Direction	3,500	3,900	3,500	-400	-10.3%
Full Time Equivalents	27	24	22	-2	-8.3%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Staff oversaw actions to achieve approximately 5,000 prime contractor reductions in FY 1998 and will oversee 3,000 to 5,000 employment changes in FY 1999 and FY 2000. They will work to streamline the approval of work force restructuring plans and develop and implement policies to integrate contract reform mechanisms. They will provide oversight of upcoming labor negotiations at four sites. They will continue efforts to mitigate impacts on communities affected by work force reductions. Staff will develop a corporate asset and privatization program during each of FY 1999 and FY 2000.			
During FY 1998, the Asset Management Program staff completed an inventory of unneeded Departmental materials and assets to be made available for sales or transfers. The Asset Management Program has the goal of realizing $15 million in asset sales during each of FY 1998, 1999, and 2000.	2,128	2,302	2,250
Travel			
Travel will enable staff to provide technical assistance to field offices on work force planning and community transition. Staff will also be able to assist field offices in labor negotiations, conducting program assessments, and providing technical assistance in asset management. Training is also included in this cost category. The increased funds would allow a staff member to enroll in the Federal Executive Institute training program during each of FY 1999 and FY 2000	75	85	85

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Support Services			
A major element of technical support during FY 1999 will consist of assisting the Office of Worker and Community Transition in implementing the new Work Force Information System (WFIS). This system will allow the department and its site management contractors to assess the skills of the present work force in comparison to projected needs and match the skills of workers identified for separation with the needs of vacancies Overall, this system should lead to better personnel management, reduce separation costs, and contribute to retaining important skills.			
The management support includes performing general management functions and conducting analyses and assessments and assisting in the preparation of the subsequent reports.	776	932	572
Other Related Expenses			
The amount in this category consists mainly of the working capital fund. Space rental, telephones, copiers and printing, computer support, general office supplies, and mailing costs are included in this fund. Other expenses are for items not encompassed by the working capital fund, e.g., computer software and professional journals.	521	581	593
Total, Program Direction	3,500	3,900	3,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Expenses	
■ Decrease of $20,000 in Salary and Benefits is due to the reduction in FTE's partially offset by a projected pay increase	-52
Travel	
■ No change is expected in Travel	0
Support Services	
■ Decrease of $492,000 in support services is due to the completion of the Work Force Information System development.	-360
Othr Related Expenses	
■ Increase of $12,000 in the Other Related Expenses is due to the effect of inflation	+12
Total Funding Change, Program Direction	-400

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services	0	0	0	0	0.0%
Management Support Services	636	772	407	-365	-47.3%
ADP Support	80	100	100	0	0.0%
Administrative Support Services	60	60	65	+5	8.3%
Total, Management Support Services	140	160	165	+5	3.1%
Total Support Services	776	932	572	-360	-38.6%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	476	535	546	+11	2.1%
Other	45	46	47	+1	2.2%
Total, Other Related Expenses	521	581	593	+12	2.1%

Fissile Materials Control and Disposition

Fissile Materials Disposition

Program Mission

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials (primarily plutonium and highly enriched uranium) have become surplus to national defense needs both in the United States and Russia. The Department of Energy's (DOE) Office of Fissile Materials Disposition is responsible for implementing a path forward for the storage of weapons-usable fissile materials and the disposition of fissile materials declared surplus to national defense needs. The efforts undertaken by the Office of Fissile Materials Disposition contribute to the Administration's approach to reduce the nuclear danger and the threat of proliferation. The Department will irreversibly dispose of the Nation's surplus plutonium and highly enriched uranium, reduce the number of sites where surplus weapons-usable materials are stored, and provide key negotiation and technical support for efforts to attain reciprocal actions for the disposition of surplus Russian plutonium.

In January 1997 the Department issued a Record of Decision covering the storage of all weapons-usable fissile materials and the disposition of surplus plutonium. Key elements are:

Future Storage
The Department is reducing the number of sites where plutonium is stored through a combination of storage and disposition alternatives. Surplus plutonium pits from Rocky Flats and SRS have been moved to Pantex to be stored, along with other surplus pits residing at Pantex, in upgraded facilities.

In August 1998, the Department issued an amended Record of Decision to remove all surplus non-pit plutonium from Rocky Flats by 2002, in accordance with the Department's June 1998 Accelerated Closure Pilot Project that calls for closing the site by 2006. The plan calls for the Department to transfer surplus non-pit plutonium from Rocky Flats to Savannah River for storage in a modified building 105-K. The expanded storage vault in the Actinide Packaging and Storage Facility at SRS will be used to store the non-pit material to be transferred from the Hanford Site. The amended Record of Decision is expected to result in a cost reduction to the Department of approximately $1.3B by eliminating plutonium storage at the Rocky Flats and Hanford sites several years sooner than originally planned.

In FY 2000 DOE will begin shipment of the surplus non-pit material from Rocky Flats to building 105-K at SRS. DOE will complete upgrades for storage of surplus plutonium pits at the Pantex Plant and begin storage of surplus pits in upgraded facilities.

Plutonium Disposition
The Department is proceeding with a hybrid plutonium disposition strategy that includes immobilization of surplus weapons plutonium with ceramic material and burning of surplus plutonium as mixed oxide (MOX) fuel in existing domestic commercial reactors to achieve the spent fuel standard. The Department plans on immobilizing non-pit surplus plutonium which is not suitable for use in MOX fuel without extensive purification, but reserves the option to immobilize the entire 50 metric tons (mt) of

declared surplus. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia. The success of these efforts will directly contribute to national security, enhance cooperation with Russia, and attain reciprocal action for the disposition of Russian surplus plutonium.

In FY 2000 DOE will begin design of an Immobilization and Associated Processing Facility; complete Title I and initiate Title II design of a full-scale Pit Disassembly and Conversion Facility and a MOX Fuel Fabrication Facility; continue testing of the pit disassembly and conversion prototype for disassembling plutonium weapons components and converting the plutonium to stable forms suitable for international inspection and disposition; establish the technical baseline for ceramic immobilization plant process; and initiate a MOX lead test assembly program. These implementation efforts will directly contribute to the advancement of U.S. and international nonproliferation interests and to improving the cost-effectiveness of the Department's management of stockpiles of surplus fissile materials.

Uranium Disposition

The Program's efforts will continue to focus on implementing the July 1996 Record of Decision to disposition up to 85% of the surplus highly enriched uranium (HEU) by down-blending it with other uranium materials to commercially-usable low enriched uranium, thereby advancing U.S. nonproliferation goals, reducing storage and security costs, and providing revenues to the Treasury from the commercial sale of these surplus assets over time. The remaining surplus HEU, originally determined to be in forms unsuitable for commercial use, was to be down blended and disposed of as waste. Subsequently, it was determined that the material is in forms suitable for down-blending and sale or suitable for disposition as waste without down blending.

To date, approximately 174.3 mt of HEU have been declared excess to national security needs. Some of that material is in the form of spent fuel, and not available for down-blending. Because of the various forms of HEU and the availability dates from weapons dismantlement and site cleanup operations, blending would take place over an estimated 15 to 20-year period. Title to 63 mt has already been transferred to the United States Enrichment Corporation (USEC). DOE expects that an additional 33 mt of off-specification HEU will be down blended and transferred to the Tennessee Valley Authority (TVA). (Additional quantities would be available after that date.) Ten mt of high quality excess HEU (currently under IAEA safeguards at the Oak Ridge Reservation) may also be down blended for commercial sale resulting in receipts starting in FY 2003.

In FY 2000 DOE will continue to transfer surplus HEU to USEC for blend down; continue plans and initiate testing for disposition of 33mt of off-specification HEU by blend down and irradiation in TVA reactors (generating receipts for the U.S. Treasury from TVA's savings in fuel costs); plan for the blend down and sale of 10mt of HEU currently under IAEA safeguards (generating receipts to partially offset future budget requests); and issue a draft environmental impact statement on disposition of approximately 1mt of U-233.

Cooperation and Reciprocity with Russia and Other Nations
In addition to domestic-based activities, FY 2000 efforts will focus on work with Russia on programs to facilitate the disposition of surplus Russian weapons plutonium. Plans are to implement a U.S./Russian accord (currently being negotiated) for disposition of excess weapons plutonium with participation from other nations. A series of collaborative disposition efforts which include analyses and small-scale tests and demonstrations of plutonium disposition technologies will continue. Technical areas being jointly evaluated include: burning the surplus plutonium in reactors; immobilization of plutonium in solid matrices; and stabilization of liquid and other forms of nuclear materials. The Department's work will directly facilitate progress with Russia in the safe, secure, verifiable disposition of surplus Russian plutonium in a manner that helps preclude its reuse in nuclear weapons.

Program Goal

Reduce the global nuclear danger by eliminating inventories of surplus weapons-usable fissile materials through strategies and implementing actions to provide safe, secure, cost effective and inspectable storage of U.S. weapons-usable fissile materials, and dispose of these surplus materials in accordance with terms set forth in agreements between the United States and Russia.

Program Objectives

- *To Provide a Department-wide Storage Configuration for Surplus Weapons-Usable Fissile Materials that is Safe, Secure, Environmentally Sound, Inspectable and Cost-effective* - Strategies are: (1) Eliminate the storage of separated, weapons-usable plutonium at the Rocky Flats Environmental Technology Site and the Hanford Site; (2) Utilize existing facilities and infrastructure to the extent practical and upgrade, as necessary, these facilities to meet safety, security, and inspection requirements; and (3) Design and construct a facility for surplus non-pit materials at the Savannah River Site (EM Project 97-D-450) and upgrade buildings for surplus pit materials at Pantex (MD Project 97-D-140). Continue the storage of surplus plutonium at the Idaho Engineering and Environmental Technology Site and Los Alamos National Laboratory, pending disposition.

- *To Eliminate the Stockpile of Surplus Uranium* - Strategies are: (1) Decrease site inventories of surplus highly enriched uranium and associated management costs by down blending HEU for subsequent sale; (2) Engage the private sector, to the extent practical, to process and disposition surplus highly enriched uranium, thereby developing the industrial infrastructure to accommodate the blend down of increased quantities of surplus HEU to commercially-usable low enriched uranium over time; and (3) Where practical, generate revenues from the disposition of HEU for the Treasury and to partially offset future budget requests.

- *To Eliminate the Stockpile of Surplus Weapons-Usable Plutonium* - Strategies are:
1) Demonstrate the early feasibility of an integrated process for the disassembly and conversion of plutonium from weapons components into forms suitable for international inspection and disposition; (2) Design, construct and operate necessary facilities to disposition surplus plutonium; (3) Rely on commercial industry for disposition activities to the extent practical; and (4) Decrease inventory of surplus plutonium and associated management costs.

- *Conduct Joint Technical Activities with Russia and Other Nations in Support of U S Efforts to Encourage Russia to Dispose of Stockpiles of Excess Weapons Plutonium* - Strategies are: (1) Support government-wide efforts to negotiate bilateral or multilateral agreements necessary to implement the disposition of U.S. and Russian plutonium no longer required for defense purposes; (2) Conduct jointly with Russia tests and demonstrations of plutonium disposition technologies; and (3) Contribute to an international effort to implement plutonium disposition in Russia.

Performance Measures

Future Storage

- Complete the upgrade of storage facilities at the Pantex Plant for storing surplus plutonium pits.

Uranium Disposition

- Transfer 7mt of the 50mt of surplus HEU to USEC for downblending to LEU for sale and subsequent use in commercial nuclear reactors.

Plutonium Disposition

- Establish technical baseline for ceramic immobilization plant process.
- Complete Title I and initiate Title II design for the Pit Disassembly and Conversion Facility.
- Complete Title I and initiate Title II design for the MOX Fuel Fabrication Facility.
- Initiate Title I design for the Immobilization and Associated Processing Facility.

Cooperation and Reciprocity With Russia and Other Nations

- Continue small scale tests and demonstrations in accordance with the U.S./Russian Scientific and Technical Cooperation Agreement.
- Begin to implement a bilateral agreement with Russia for disposing of plutonium in Russia.

NEPA

- Issue a draft environmental impact statement on disposition of U-233 and conduct public outreach, including public meetings.

Significant Accomplishments and Program Shifts

Future Storage

- Completed shipment of surplus weapons pits from Rocky Flats to Pantex.
- Completed shipment of surplus weapons pits from SRS to Pantex.
- Accelerated the timetable for reducing the number of sites where plutonium is stored.
- Completed design for a future storage facility at SRS for surplus non-pit materials and issued a Request for Proposal (RFP) for construction of the Actinide Packaging and Storage Facility (EM Project 97-D-450).

Uranium Disposition

- Signed a Memorandum of Agreement with USEC for the transfer and blend down of 50mt of surplus HEU.
- Began shipping HEU to USEC's blending subcontractor.
- Prepared a Project Plan for the transfer and subsequent blend down of approximately 33mt of surplus off-specification HEU to the Tennessee Valley Authority (TVA).
- Blended down the first installment of off-specification HEU for lead test assemblies for TVA.

Plutonium Disposition

- Pit Disassembly and Conversion
  - Started operation of the pit disassembly and conversion prototype.
- Immobilization
  - Established baseline immobilization form.
  - Completed conceptual design of the Immobilization and Associated Processing Facility.
  - Immobilized plutonium waste form included in repository technical baseline program.
- MOX/Reactor
  - Issued an RFP, solicited and evaluated proposals for the selection of a private contractor consortium to provide MOX fuel fabrication and irradiation services.

- Initiated tests of MOX fuel made from weapons-derived plutonium in the Advanced Test Reactor (ATR) in Idaho.

- Conducted preliminary experiments on the effects of gallium on fuel performance.

Cooperation and Reciprocity With Russia and Other Nations

- Negotiated a Scientific and Technical Cooperation Agreement with Russia, signed by the Vice President of the United States and the Russian Prime Minister, to proceed with tests and demonstrations for surplus plutonium disposition up to and including pilot scale.

- Supported negotiations which resulted in a Joint Statement of Principals for Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes with Russia, signed by the President of the United States and the President of the Russian Federation.

- Initiated feasibility studies on a plutonium conversion system in Russia.

- Initiated testing in Russia of processes for converting plutonium metal to specification oxide.

- Continued small-scale tests in Russia of vitrification and performed analysis of using MOX fuel in Russian reactors.

- Started discussions on U.S./Russian plutonium disposition accord.

NEPA

- Issued an amended Record of Decision to remove and ship all weapons-usable surplus non-pit plutonium from Rocky Flats to SRS by 2002, and remove and ship Hanford surplus weapons-usable plutonium to SRS during 2002 through 2005, in accordance with the Department's June 1998 Accelerated Closure Pilot Project.

- Prepared analyses and issued a draft environmental impact statement which identified preferred sites for the facilities for implementing the hybrid disposition approach for surplus plutonium disposition.

- Issued environmental assessments (EAs) on the operation of the pit disassembly and conversion prototype.

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Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Orginal Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Fissile Materials Disposition					
Operation and Maintenance	99,451	116,372	0	116,372	129,766
Russian Plutonium Disposition	0	200,000	0	200,000	0
Program Direction	4,345	4,588	0	4,588	7,343
Subtotal, Fissile Materials Disposition	103,796	320,960	0	320,960	137,109
Construction	0	48,000	0	48,000	62,891
Subtotal, Fissile Materials Disposition	103,796	368,960	0	368,960	200,000
Use of Pnor Year Balances	-119	-1,469	0	-1,469	0
Total, Fissile Materials Disposition	103,677	367,491	0	367,491	200,000

Public Law Authorization:
PDD-13 Nonproliferation and Export Control Policy - 9/93
Public Law 103-337 Establishes permanent DOE Office - 10/94
PDD-41 Improving Nuclear Security in Russia - 10/95
Public Law 104-134 USEC Privatization Act - 4/96

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	30,917	35,035	36,768	1,733	4.9%
Pantex	175	930	4,300	3,370	362.4%
Sandia National Laboratory	3,575	2,410	3,100	690	28.6%
Total, Albuquerque Operations Office	34,667	38,375	44,168	5,793	15.1%
Chicago Operations Office	722	763	860	97	0.0%
Argonne National Laboratory	1,993	1,785	1,809	24	1.3%
MOX Fuel Fabrication Facility Design	0	28,000	12,375	-15,625	-55.8%
MOX Fuel Fabrication & Irradiation Contractor	0	9,000	15,000	6,000	66.7%
Total, Chicago Operations Office	2,715	39,548	30,044	-9,504	-24.0%
Federal Energy Technology Center	5,515	1,884	3,650	1,766	93.7%
Nevada Operations Office	850	1,660	2,175	515	31.0%
Oakland Operations Office					
Oakland Operations Office	770	0	0	0	0.0%
Atomic Energy of Canada, Ltd	1,025	500	0	-500	-100.0%
Lawrence Livermore National Laboratory	25,154	30,760	25,466	-5,294	-17.2%
Total, Oakland Operations Office	26,949	31,260	25,466	-5,794	-18.5%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	13,754	15,507	16,136	629	4.1%
Y-12	3,814	3,295	3,353	58	1.8%
Total, Oak Ridge Operations Office	17,568	18,802	19,489	687	3.7%
Richland Operations Office					
Richland Operations Office	65	0	0	0	0.0%
Pacific Northwest Laboratory	2,105	2,023	1,842	-181	-8.9%
Total, Richland Operations Office	2,170	2,023	1,842	-181	-8.9%
Rocky Flats Field Office	44	0	0	0	0.0%
Savannah River Operations Office					
Savannah River Operations Office	281	0	0	0	0.0%
Westinghouse Savannah River	7,516	10,640	15,067	4,427	41.6%
Total, Savannah River Operations Office	7,797	10,640	15,067	4,427	41.6%
Washington Headquarters	5,521	4,768	5,878	1,110	23.3%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Undesignated Field Offices	0	0	1,705	1,705	100.0%
Pit Disassembly & Conversion Facility Design	0	20,000	28,751	8,751	43.8%
Immobilization & Associated Processing Facility Design	0	0	21,765	21,765	100.0%
Russian Plutonium Disposition	0	200,000	0	-200,000	-100.0%
Subtotal, Fissile Materials Disposition	103,796	368,960	200,000	-168,960	-45.8%
Use of Prior Year Balances	-119	-1,469	0	1,469	100.0%
Total, Fissile Materials Disposition	103,677	367,491	200,000	-167,491	-45.6%

Site Description

Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory (LLNL) serves as the lead laboratory in the development of technologies that will lead to immobilization of surplus plutonium materials into disposition forms that meet the spent fuel standard. LLNL develops technical and engineering data on the preferred ceramic plutonium form (using can-in-canister technology) to support facility design and qualification for repository disposal. LLNL supports the design of an immobilization facility which will contain systems for converting various incoming plutonium materials into a uniform oxide feed, blending the oxide feed with other materials into ceramic discs and placing these discs into small cans, which in turn are placed into a larger canister subsequently filled with high level vitrified waste. LLNL also performs research and development tasks and design support for the pit disassembly and conversion demonstration and full-scale facility. In addition, LLNL is conducting initial immobilization feasibility studies for possible disposition of surplus Russian plutonium.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL) serves as the lead laboratory in the development and demonstration of a weapons pit disassembly and conversion process. This process establishes a basis for conversion of all surplus weapon pit types into an oxide powder form suitable for inspection and disposition. The Advanced Recovery and Integrated Extraction System (ARIES) at LANL serves as the current system demonstration project. A production-scale facility will be supported through the development of a knowledge base from the demonstration facility activities and through LANL's assistance in the procurement of design services for the full-scale facility. The pit disassembly and conversion team consists of LANL, LLNL, and Sandia National Laboratory (SNL). LANL has the lead on MOX fuel technology supporting Oak Ridge National Laboratory (ORNL) in the program's efforts to transform the plutonium powder produced from surplus weapons pits to commercial spent nuclear fuel. LANL performs a spectrum of research and development tasks and technical support for a MOX fuel fabrication facility which will convert the plutonium oxide powder to MOX fuel suitable for use as a fuel source in U.S. commercial nuclear reactors. LANL is capable of producing MOX fuel for reactor

test demonstration purposes. LANL also serves as the lead for the design of a plutonium conversion line in Russia which will convert surplus Russian plutonium from metal to oxide for fabrication into MOX fuel or other disposition approaches.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) serves as the lead laboratory in the development of technologies that will enable disposition of surplus plutonium materials by burning as MOX fuel in commercial reactors. ORNL performs research and development on gallium effects on MOX fuel, develops technical and engineering data on fabrication of domestic lead fuel assemblies to reactor specifications, and conducts reactor licensing. ORNL also serves as the lead for the Parallex heavy water reactor (CANDU) fuel and irradiation experiments and the development of gas reactor technology in Russia for plutonium disposition Physics support is also provided for analysis of Russian VVER-1000 reactors for disposition of Russian plutonium. In addition, ORNL serves as the lead for U-233 disposition activities.

Savannah River Site

The Savannah River Site (SRS) provides technology support for immobilization of surplus plutonium in the areas of ceramic form development and immobilization process and equipment development. In addition, SRS provides support in disposition of off-specification HEU at TVA and disposition of U-233. SRS is the lead on the construction of the Actinide Packaging and Storage Facility (EM Project 97-D-450).

All Other Sites

The Argonne National Laboratory (ANL) and the Pacific Northwest National Laboratory (PNNL) provide support to LLNL by performing immobilization performance testing activities. The Y-12 Site and the Oak Ridge Operations Office serve as the lead for all HEU disposition activities. The Sandia National Laboratory (SNL) provides support for pit disassembly and conversion, Russian activities, and U.S. program integration activities. The Pantex Site provides support for upgrades for storage of surplus pit materials from Rocky Flats and SRS. The Nevada Operations Office (NV) contracts for repository analysis support associated with disposition technologies. The Federal Energy Technology Center (FETC) contracts for environmental analysis support for disposition technologies. The Chicago Operations Office (CHO) provides procurement support for the private contractor consortium to provide MOX fuel fabrication and irradiation services and the contractor to provide design services for the pit disassembly and conversion facility.

Operation and Maintenance

Mission Supporting Goals and Objectives

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials (primarily plutonium and highly enriched uranium) have become surplus to national defense needs both in the United States and Russia. The threat that nuclear weapons or materials could fall into the wrong hands through theft or diversion is a clear and present danger. The danger exists not only in the potential for proliferation of nuclear weapons, but also in the potential for environmental, safety and health consequences if surplus fissile materials are not properly managed. United States policy is to seek to eliminate, where possible, accumulation of stockpiles of highly enriched uranium and plutonium, and to ensure that where these materials already exist they are subject to the highest standards of safety, security, and international accountability.

This budget reflects funds necessary to continue implementing the consolidated storage and disposition of surplus weapons-usable fissile materials based upon the Department's January 1997 and August 1998 Records of Decision. Cost and schedule estimates for plutonium disposition are based on conceptual design estimates pending completion of detailed cost estimates following site selection, contract award for a consortium to provide MOX fuel fabrication and irradiation services, and Title I design for disposition facilities. Funds requested for implementation of HEU disposition are based upon the Department's July 1996 Record of Decision to blend down U.S. surplus highly-enriched uranium to low-enriched uranium for peaceful use as commercial reactor fuel. Key storage and disposition decisions are:

Future Storage

- **Rocky Flats**: Phase out storage of all weapons-usable plutonium at Rocky Flats Environmental Technology Site; move pits to Pantex during a two year period beginning in 1997, and move separated and stabilized non-pit materials to Savannah River during a two-year period beginning in 2000.

- **Pantex**: Upgrade facilities at Pantex to store surplus plutonium pits including pits from Rocky Flats and SRS.

- **Savannah River**: Upgrade building 105-K at SRS to store surplus, non-pit plutonium materials currently at the Rocky Flats Environmental Technology Site. The Department will begin moving the Rocky Flats material in 2000 and finish in 2002. Expand the planned Actinide Packaging and Storage Facility to be built at SRS to store surplus, non-pit plutonium materials currently at SRS and surplus non-pit plutonium materials from the Hanford Site pending the start of plutonium disposition. The Department will begin moving the Hanford material in 2002 and finish in 2005 (EM Project 97-D-450).[a]

Plutonium Disposition

The Department plans to dispose of quantities of surplus plutonium by immobilizing it in ceramic form surrounded by vitrified high level waste and by burning surplus plutonium as mixed oxide (MOX) fuel in existing, domestic reactors. While both approaches are viable for the disposition of surplus weapons usable plutonium, the program needs to optimize the technical approach and finalize cost estimates. Accordingly, the Department's plans include completing the necessary process development and small-scale technology tests, including "can-in-canister" immobilization tests and tests of MOX fuel fabrication and irradiation, and obtaining detailed cost proposals from industry.

For the immobilization approach, the Department needs to finalize the process for formulating plutonium in ceramic materials, the production processes, and the assessment of the impact of impurities on the surplus plutonium forms. Title I design of a Immobilization and Associated Processing Facility will begin in FY 2000.

For the MOX burning in existing reactors approach, the Department needs to complete the procurement process to select a private consortium to provide a MOX Fuel Fabrication Facility and irradiation services, and finalize experiments on potential impacts of other materials alloyed in plutonium pits on fuel performance. Title I design of a MOX Fuel Fabrication Facility will be completed early in FY 2000 and Title II will commence.

Other Disposition-Related Activities

- Complete design and operational testing of the processes that would be used to convert the plutonium from pits and other forms into oxide powder which would serve as feed material for both the disposition technologies as well as for international inspection. Title I design of a Pit Disassembly and Conversion Facility will be completed early in FY 2000 and Title II will commence.

- Continue disposition of surplus HEU by down-blending with other uranium materials to commercially-usable low enriched uranium and subsequent sale.

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[a]EM Project 97-D-450, Actinide Packaging and Storage Facility (APSF), will be reevaluated and may not be constructed. If the reevaluation results in a decision not to move forward with APSF, the Department would develop an amended Record of Decision to address the movement of non-pit material from the Hanford Site to SRS and where it will be stored.

- Issue a draft environmental impact statement on disposition of U-233 . This effort will provide the initial step toward the ultimate disposition decision in accordance with Defense Board recommendations.

- Select sites for constructing and operating a pit disassembly and conversion facility, a MOX fuel fabrication facility, and an immobilization and associated processing facility. The Savannah River Site has been identified as the Department's Preferred Site for all three plutonium disposition. Final selection of the site(s) for plutonium disposition will be made in a Record of Decision scheduled for the spring of 1999.

- Continue and expand a range of U.S. and U.S.-Russian small-scale tests and demonstrations of plutonium disposition technologies is needed to build trust and cooperation and help prepare for reciprocal implementation of future plutonium disposition actions and agreements . This work will complete the technical knowledge base, identify viability of certain technologies, and demonstrate the practical usefulness of some of the technologies that might be employed for disposition of surplus weapons plutonium.

- Provide oversight and management of plutonium disposition activities in Russia as defined in the U.S./Russian accord currently being negotiated.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Future Storage	330	930	4,300	3,370	362.4%
Disposition	87,640	110,824	119,862	9,038	8.2%
Technical Integration, Support & Associated Technologies	6,268	2,703	2,304	-399	-14.8%
NEPA Compliance	5,094	1,915	3,300	1,385	72.3%
Total, Operation and Maintenance	99,332	116,372	129,766	13,394	11.5%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Future Storage			
■ Prepare a site-specific storage facility conceptual design for pit materials and resolve issues related to storage operations	330	930	0
■ Begin operation of the upgraded storage area at Pantex for surplus plutonium pit materials (shared with Defense Programs)	0	0	4,300
Total, Future Storage	330	930	4,300
Disposition			
■ Highly Enriched Uranium (HEU) Disposition			
▸ Conduct surplus HEU planning, management, characterization, and project management	1,966	1,030	1,139
▸ Complete certification and procure new shipping containers for surplus HEU metal and oxides	943	915	565
▸ Carryout off-specification surplus HEU fuel project with TVA	556	900	1,050
▸ Provide support for transfer of 50mt of surplus HEU to USEC	489	450	499
■ U233 Disposition			
▸ Work on strategy, regulatory issues, environmental data collection for U233 disposition	500	900	2,535

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Plutonium Disposition			
▸ Complete construction and perform initial testing of the pit disassembly and conversion prototype system	19,120	0	0
▸ Continue Phase II testing of the LANL prototype system to disassemble and convert surplus plutonium pits to oxide	0	17,430	18,867
▸ Conduct repository analyses associated with disposition technologies	850	1,660	2,175
▸ Conduct performance testing and qualification of ceramic immobilization form, analyze first stage immobilization process and equipment development, and establish technical baseline for ceramic immobilization plant process	31,000	32,000	32,315
▸ Procure plutonium disposition services including fuel qualification, licensing, and initiate a lead test assembly program (irradiation tests)	20,516	25,594	35,772
■ Cooperation and Reciprocity With Russia and Other Nations			
▸ Continue small-scale tests involving burning the surplus plutonium in reactors and immobilization of plutonium in solid matrices; develop roadmap to support negotiating and financing plutonium disposition in Russia; and expenditures in the U.S. to implement a U.S./Russian accord for disposition of excess weapons plutonium (oversight and management)	11,700	24,945	24,945
▸ Conduct joint U.S. Russian development program of gas reactor technology to dispose of surplus Russian plutonium with $3M in Russia (Russia matches contributions or provides contributions in kind) and $2M in the U.S	0	5,000	0
Total, Disposition	87,640	110,824	119,862

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Technical Integration, Support and Associated Technologies			
■ Conduct crosscutting technologies that support all disposition alternatives, including program integration efforts	6,268	2,703	2,304
National Environmental Policy Act (NEPA) Compliance			
■ Issue a draft environmental impact statement (EIS) on disposition of U-233	5,094	1,915	3,300
Total, Operation and Maintenance	99,332	116,372	129,766

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Future Storage	
■ The increase is due to the start of operations at the upgraded storage facility at Pantex for surplus pit materials	+3,370
Disposition	
■ The increase is due to the start of U-233 disposition activities and procurement of lead test assembly equipment for the MOX fuel approach	+9,038
Technical Integration, Support & Associated Technologies	
■ The net decrease is due to a reduction in support services activities moved to Program Direction in accordance with Congressional direction	-399
NEPA Compliance	
■ The increase is for environmental analyses associated with the disposition of U233, partially offset by a reduction in support services outreach activities moved to Program Direction in accordance with Congressional direction	+1,385
Total Funding Change, Operation and Maintenance	+13,394

Russian Plutonium Disposition

Mission Supporting Goals and Objectives

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials have become surplus to national defense needs both in the United States and Russia. The Presidents of the United States and the Russian Federation affirm the intention of each country to remove by stages approximately 50 mt of plutonium from their nuclear programs, and to transform this material so that it can never be used in nuclear weapons. Both sides have agreed to develop strategies for the management and disposition of plutonium which will be described in a bilateral agreement currently being negotiated.

The Department of Energy's (DOE) Office of Fissile Materials Disposition is responsible for funding initial expenditures in the Russian Federation to implement a United States/Russian accord for the disposition of Russian excess plutonium. The $200M provided in FY 1999 represents initial funding required to provide United States assistance to Russia to begin implementing a plutonium disposition accord.

The U.S objective is to negotiate an accord specifying the technological approach and the facilities to be constructed in Russia in the initial phase of United States/Russia cooperation, which would have an annual capacity of two tons of plutonium per year. The two governments would further agree to a concept for a subsequent phase of cooperation that would increase the rate of plutonium disposition in Russia to 5 mt per year or more.

Detailed strategies will be defined in the accord. A detailed budget justification and obligation plan will be submitted to Congress once strategies are defined as negotiations progress. Obligation of these funds is contingent upon a signed accord and Congressional approval of the budget justification (in preparation). These funds will be expended in the Russian Federation over a 2-3 year period following completion of the accord. Beyond that, the Administration plans to seek financing for a portion of this program from the international community, both the private and public sector. If, however, the program requires additional future appropriations, the Administration is committed to funding adequate resources in the normal budget process.

The Department's work will directly facilitate progress with Russia in the safe, secure, transparent disposition of surplus Russian plutonium in a manner that precludes its reuse in nuclear weapons.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Russian Plutonium Disposition	0	200,000	0	-200,000	-100%
Total, Russian Plutonium Disposition	0	200,000	0	-200,000	-100%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Russian Plutonium Disposition			
■ Implement a U.S./Russian accord for disposition of excess weapons plutonium. Initial funds are primarily for design and to begin construction of Russian disposition facilities to be specified in the accord. The U.S. and Russia have not yet agreed on rates, techniques, and facilities for plutonium disposition, but discussions include a plutonium conversion facility and a MOX fuel fabrication facility. These funds will be expended over a 2-3 year period following completion of the accord	0	200,000	0
Total, Russian Plutonium Disposition	0	200,000	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Russian Plutonium Disposition	
■ The decrease is due to a one-time emergency appropriation of $200,000,000 in FY 1999 for Russian plutonium disposition activities	-200,000
Total Funding Change, Russian Plutonium Disposition	-200,000

Fissile Materials Disposition Program Direction

Mission Supporting Goals and Objectives

Program direction provides overall management, oversight, staffing, and administrative support necessary to carry out the mission of the Fissile Materials Disposition Program. Operations are conducted in an efficient and streamlined manner consistent with National Performance Review objectives. Program direction has been grouped into four categories:

Salaries and Benefits provides for Federal personnel compensation to include SES and other awards, overtime, lump sum leave payments, transit subsidy costs, and employer's contribution to employees' benefits.

Travel includes domestic and foreign trips necessary to conduct business in carrying out the mission of the program. International travel is frequent in that Fissile Materials Disposition program officials work closely with Russian and other G-7 scientists and government officials on plutonium disposition issues.

Support Services include program analyses and office operations functions which result in improving the effectiveness, efficiency, and economy of management and general administrative services. Activities also include outreach and project scheduling.

Other Related Expenses include employee training; interpreter services; subscriptions; building occupancy; telecommunications; supplies; copiers; postage; printing and graphics; payroll outsourcing; and other miscellaneous expenses associated with office operations.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	3,132	3,334	4,884	1,550	46.5%
Travel	240	300	300	0	0.0%
Support Services	232	232	1,223	991	427.2%
Other Related Expenses	741	722	936	214	29.6%
Total, Program Direction	4,345	4,588	7,343	2,755	60.0%
Full Time Equivalents[a]					
Headquarters	25	28	28	0	0.0%
Field	2	4	11	+7	21.0%
Total, Full Time Equivalents	27	32	39	+7	21.0%

[a]FTEs above FY 1998 request 25 (+2) and FY 1999 request (+7) of 25 were funded from prior balances

Detailed Program Direction Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Federal Staff provide management oversight and technical support for the safe, secure, environmentally sound future storage of all weapons-usable fissile materials and the disposition of fissile materials declared surplus to national defense needs. The increase is due to +14 FTEs over the FY 1999 funding request for 25 FTEs. Eleven of the +14 FTEs are in the field for oversight and project management of plutonium disposition facility activities . .	3,132	3,334	4,884
Travel			
Funding supports domestic and foreign trips required to provide management oversight and technical support to the program, and ensure cooperation and collaboration with Russia and other nations on the disposition of plutonium	240	300	300
Support Services			
Funding supports office operations functions designed to improve overall effectiveness. Support Services reflects an increase for activities moved from program funding in accordance with Congressional direction	232	232	1,223
Other Related Expenses			
Supports employee training, office automation support and activities funded by the Working Capital Fund. The increase is due to an FTE increase of +14 and allowable inflation for Working Capital Fund activities and other office operations	741	722	936
Total, Program Direction	4,345	4,588	7,343

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ The increase is for +14 FTEs over FY 1999 base funding for 25 FTEs (+7 FTEs were funded in FY 1999 with prior year balances). Of the +14, +11 FTEs are in the field for oversight and project management of design of three plutonium disposition facilities. Three FTEs are in Headquarters to support Russian activities. Salary adjustments in accordance with allowable inflation factors are also included.	+1,550
Support Services	
■ The increase includes support services activities moved from program funding in accordance with Congressional direction. Activities include outreach and project scheduling activities	+991
Other Related Expenses	
■ The increase is directly related to the FTE increase and will cover space, AOSS equipment and other miscellaneous costs	+214
Total Funding Change, Program Direction	+2,755

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Outreach[a]	0	0	350	350	100.0%
Total, Technical Support Services	0	0	350	350	100.0%
Management Support Services					
Project Scheduling/Program Support[b]	0	0	500	500	100.0%
ADP Support	90	95	100	5	5.3%
Administrative Support Services	142	137	273	136	99.3%
Total, Management Support Services	232	232	873	641	276.3%
Total, Support Services	232	232	1,223	991	427.2%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	23	25	25	0	0.0%
Working Capital Fund	513	544	744	200	36.8%
Other	205	153	167	14	9.2%
Total, Other Related Expenses	741	722	936	214	29.6%

[a]Outreach activities moved from program funding in accordance with Congressional direction.

[b]Project scheduling activities moved from program funding in accordance with Congressional direction

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	2,940	3,680	10,350	6,670	181.3%
Total, Capital Operating Expense	2,940	3,680	10,350	6,670	181.3%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
99-D-141 Pit Disassembly & Conversion Facility	346,192	0	0	20,000	28,751	297,441
00-D-142 Immobilization & Associated Processing Facility	547,000	0	0	0	21,765	525,235
99-D-143 Mixed Oxide Fuel (MOX) Fuel Fabrication Facility	383,186	0	0	28,000	12,375	342,811
Total, Construction		0	0	48,000	62,891	1,165,487

Detailed Breakouts

(dollars in thousands)

	Previous Approp.	FY 1998 Approp.	FY 1999 Approp.	FY 2000 Request
Other Project Costs Exceeding $3 Million				
1. Pit Disassembly & Conversion Facility	24,000	17,790	14,930	17,867
2. Immobilization & Associated Processing Facility	30,000	15,000	15,000	10,000
3. MOX Fuel Fabrication Facility	9,000	6,870	5,100	5,000
Total	63,000	39,660	35,030	32,867

99-D-141, Pit Disassembly and Conversion Facility - Title I & II Design, Various Locations (SRS, Pantex, Hanford, or Idaho)

(Changes from FY 1999 Congressional budget Request are denoted with a vertical line [|] in the left margin)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(A-E and technical design only)*	1Q 1999	3Q 2001	N/A	N/A		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 1999	4Q 2001	2Q 2001[a]	4Q 2004	[b]	[b]

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design & Long Lead Equipment			
1999	20,000	20,000	12,000
2000	28,751	28,751	28,000
2001	20,000	20,000	23,751
2002	0	0	5,000

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic matrix and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. In order to implement the hybrid approach, surplus classified nuclear weapons components (pits) must first be disassembled and the resulting plutonium converted to an unclassified oxide powder form. No such facilities currently

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[a]Site preparation will begin in 2Q FY 2001

[b]Preliminary cost estimates for the Pit Disassembly and Conversion Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) – approximately $346,000,000 and Total Project Cost (TPC) – approximately $586,000,000. These estimates are used for the purpose of requesting design and long lead equipment funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia.

exist in the United States. A Pit Disassembly and Conversion Facility will provide the U.S. with the capability to transform classified plutonium weapons pits to an unclassified oxide form suitable for disposition and international inspection.

The Pit Disassembly and Conversion Facility is a complex consisting of a hardened building that will contain the plutonium processes in a safe and secure manner and conventional buildings and structures that will house support personnel, systems and equipment. The plutonium processing building will be a material access area, require approximately 150,000 square feet, and house the following key systems: pit shipment, receiving, assay and storage; pit plutonium metal extraction and conversion to oxide; and plutonium oxide packaging, assay, storage and shipment. Also included are facilities for recovery, decontamination, and declassification of other special nuclear material and non-special nuclear material resulting from pit disassembly. In addition, there are facilities to accommodate IAEA safeguards for specific portions of the processes and facility. The conventional buildings and structures, requiring approximately 50,000 square feet, will house offices, change rooms, an analytical chemistry laboratory, a central control station, waste treatment, packaging, storage and shipment systems. The facility will have the capacity to process 3.5 metric tons of surplus plutonium per year.

The Pit Disassembly and Conversion Facility project consists of: design and construction of the buildings and structures, design, procurement, installation, testing and start-up of equipment to disassemble pits and convert the plutonium from pits to oxide form, as well as associated supporting equipment, components and systems. The facility is planned to be operated for a ten year period beginning in FY 2005 and then decontaminated and decommissioned over a three to four-year period. Four sites (Hanford, Idaho National Engineering and Environmental Laboratory, Pantex, and Savannah River) are being considered for the full-scale Pit Disassembly and Conversion Facility. In December 1998 the DOE identified Savannah River Site as the preferred location to build the Pit Disassembly and Conversion Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement

This budget request precedes upcoming site selection decisions that will define the scope of the Pit Disassembly and Conversion Facility. As a result, funds requested for Title I and II facility design are based on a conceptual design for a new facility with established general support infrastructure. The Title I & II funding request will not prejudice the final ROD, but helps assure that construction funding is available to support prompt implementation of Title I design following the ROD in the spring of 1999 and continue design in FY 2000.

Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design. The final baseline will be used to measure performance.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	33,383	33,383
Design management costs @ 10% of above costs	3,908	3,908
Total, design phase	37,291	37,291
Contingencies at approximately 27% of above costs		
Design phase	10,105	10,105
Long lead equipment *	21,355	21,355
Total Agency Requirement (Design and Long Lead Equipment)	68,751	68,751

5. Method of Performance

Method of performance will not vary by location. It is expected that a cost plus fixed fee contract will be the most appropriate and cost beneficial for the design work. It is anticipated that the construction procurement will be a fixed price contract awarded on the basis of competitive bidding.

*Equipment included in the long lead items are: robotic cranes and track mounted robots in the shipping and receiving system, vault doors in the storage system, material control and accountability computer system, the californium shufflers, and equipment for the waste assay system.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design & Long Lead Equipment Cost						
Design	0	0	20,000	17,396	10,000	47,396
Plant Engineering & Design (PE&D)	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
Total Design Costs (Federal and Non-Federal)	0	0	20,000	17,396	10,000	47,396
Other Project Costs						
R&D necessary to complete project	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	0	0	0	0	0	0
Total Other Project Costs	0	0	0	0	0	0
Long Lead Equipment	0	0	0	11,355	10,000	21,355
Total Agency Requirement (Design & Long Lead Equipment)	0	0	20,000	28,751	20,000	68,751

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility Operating Costs	*	

8. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and Nuclear Regulatory Commission licensing standards (the facility will not be NRC licensed). The preliminary total estimated cost estimates for the project include the costs of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards"; section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41CFR 101-19.6.

*Related annual costs will be defined during the Title I design effort and reflected in the FY 2001 budget request.

00-D-142, Immobilization & Associated Processing Facility - Title I & II Design, Various Locations (SRS or Hanford)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(A-E and technical design only)*	N/A	N/A	N/A	N/A	N/A	N/A
FY 2000 Budget Request *(Preliminary Estimate)*	1Q 2000	2Q 2002	1Q 2002	1Q 2005	*	*

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
2000	21,765	21,765	15,330
2001	26,171	26,171	32,500
2002	20,000	20,000	20,106

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic form and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. The immobilization process that the Department plans to use is the can-in-canister approach in which cans of plutonium immobilized with ceramic material would be arrayed within large canisters into which intensely radioactive high-level waste would be poured. The resulting large, heavy, radioactive waste canisters increase the proliferation resistance of the immobilized plutonium. The waste canisters containing the immobilized weapons plutonium would ultimately be disposed of in a geologic repository.

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*Preliminary cost estimates for the Immobilization and Associated Processing Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) – approximately $547,000,000 and Total Project Cost (TPC) – approximately $828,000,000. These estimates are used for the purpose of requesting design funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia.

The Immobilization and Associated Processing Facility will contain all the systems required for: (1) Plutonium Conversion: receiving stabilized non-pit plutonium and converting the material to an acceptable oxide feed form; (2) Initial Immobilization: blending the plutonium oxide feed with precursor materials and solidifying the resultant product into ceramic forms, and placing the ceramic forms into small cans; and (3) High Level Waste (HLW) Immobilization: placement of the small cans into a larger canisters which is filled with borosilicate glass containing HLW and sealed. In the Programmatic Environmental Impact Statement (PEIS), DOE narrowed the field of candidate disposition sites for the Immobilization and Associated Processing Facility to Savannah River and Hanford. Both sites have an existing or planned HLW immobilization infrastructure as well as general support infrastructure in place such as a fire department, security protection forces, and water and sewage treatment plants. In a Notice of Intent to prepare the site specific EIS, DOE identified the Savannah River Site as the preferred site for the Immobilization and Associated Processing Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement.

The Immobilization and Associated Processing Facility is a complex consisting of a hardened building that will contain the plutonium processes in a safe and secure manner and conventional buildings and structures that will house support personnel, systems and equipment. The seismically hardened new construction will require approximately 150,000 square feet, and house the following key systems: material receipt and storage, oxide fuel feed preparation; metal fuel feed preparation; grinding; material unpacking and sorting; metal conversion to oxide; impure oxide feed preparation; materials characterization; materials control and accountability; in-process storage; feed batching; ceramic feed preparation; pellet characterization; sintering; recycle; can loading; can characterization; can storage; canister loading and assembly; and the canister transport system. In addition, conventional building space requiring approximately 50,000 square feet to house office space, change rooms, and utilities will be constructed. The existing site infrastructure containing the analytical laboratory and the Actinide Packaging and Storage Facility (originally planned for completion before construction of the Immobilization facility) of approximately 30,000 square feet will be used for sample analysis and storage of select incoming materials.*

The Department plans on immobilizing non-pit surplus plutonium which is not suitable for use in mixed oxide fuel without extensive purification, but reserves the option to immobilize the entire 50mt of declared surplus. Because of the time required to prepare some materials for immobilization, ten years is the estimated time to immobilize up to 50mt after which the facility will be decontaminated and decommissioned over a three to four-year period. The facility will begin operations in FY 2006.

This budget request precedes upcoming site selection decisions that will define the scope of the Immobilization and Associated Processing Facility. As a result, funds requested for facility design are based on DOE's can-in-canister approach utilizing the existing HLW and the Defense Waste Processing

*EM Project 97-D-450, Actinide Packaging and Storage Facility (APSF), will be reevaluated and may not be constructed and therefore will not be available to provide necessary receipt and storage functions required for the immobilization facility. The preliminary estimates for the immobilization facility do not include a minimum of 10,000 sq. ft for these functions should APSF not be constructed.

Facility (DWPF) with existing general support infrastructure. The Title I funding request will not prejudice the final decision, rather, it would help assure that construction funding is available to support prompt FY 2000 implementation of Title I design following the ROD in the spring of 1999.

Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design.. The final baseline will be used to measure performance.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	46,327	0
Design management costs @ 8% of above costs	3,996	0
Total, design phase	50,323	0
Contingencies at approximately 35% of above costs		
Design phase	17,613	0
Total Agency Requirement (Design Only)	67,936	0

5. Method of Performance

Method of performance will not vary by location. It is expected that a cost plus fixed fee contract will be the most appropriate and cost beneficial for the design work. It is anticipated that the construction procurement will be a fixed price contract awarded on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design Cost						
Design	0	0	0	21,765	46,171	67,936
Plant Engineering & Design (PE&D)	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
Total Design Costs (Federal and Non-Federal)	0	0	0	21,765	46,171	67,936
Other Project Costs						
R&D necessary to complete project	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	0	0	0	0	0	0
Total Other Project Costs	0	0	0	0	0	0
Total Agency Requirement (Design only)	0	0	0	21,765	46,171	67,936

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility Operating Costs		

8. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and Nuclear Regulatory Commission licensing standards (the facility is not expected to be NRC licensed). The preliminary total estimated cost estimates for the project include the costs of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards"; section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41CFR 101-19.6.

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*Related annual costs will be defined during the Title I design effort and reflected in the FY 2002 budget request.

99-D-143, Mixed Oxide Fuel Fabrication Facility - Title I & II Design, Various Locations (SRS, Pantex, Hanford, or Idaho)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(A-E and technical design only)*	1Q 1999	4Q 2001	N/A	N/A		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 1999	4Q 2001	1Q 2002	4Q 2005	*	*

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	28,000	28,000	15,000
2000	12,375	12,375	20,700
2001	10,000	10,000	14,675

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic form and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. A Mixed Oxide (MOX) Fuel Fabrication Facility will provide the U.S. with the capability to convert specification plutonium dioxide derived from surplus weapons grade plutonium stocks to MOX fuel suitable for use as a fuel source in U.S. commercial nuclear reactors, with subsequent disposal of the spent fuel to be carried out in accordance with the Nuclear Waste Policy Act.

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*Preliminary cost estimates for the Mixed Oxide Fuel Fabrication Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) – approximately $383,000,000 and Total Project Cost (TPC) – approximately $575,000,000. These estimates are used for the purpose of requesting design funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia

The MOX Fuel Fabrication Facility will contain all the systems required for: receiving plutonium oxide from the Pit Disassembly and Conversion Facility; processing and blending of fuels materials, fabrication of fuel pellets, loading pellets into rods, assembly of completed fuel bundles and shipment to commercial reactors for irradiation. The facility will meet current commercial standards for nuclear fuel manufacturing utilizing the extensive experience base of European fabrication of MOX fuel. The facility will be licensed by the Nuclear Regulatory Commission and operated by a private sector consortium for the Department. Four sites (Hanford, Idaho National Engineering and Environmental Laboratory, Pantex, and Savannah River) are being considered for the MOX Fuel Fabrication Facility. Several proposed sites have general support infrastructure in place such as a fire department, security protection forces, and water and sewage treatment plants. In June 1998 the DOE announced the Savannah River Site as the preferred location to build the MOX Fuel Fabrication Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement.

The MOX Fuel Fabrication Facility will require approximately 120,000 sq. ft of hardened building which will contain the following systems: plutonium oxide and oxide receiving and storage; MOX powder preparation; pelletizing; sintering; pellet grinding and inspection; fuel rod loading and rework; fuel rod inspection and storage, fuel bundle assembly; clean scrap recovery, processing and recycle; analytical laboratory, contaminated waste, and interim storage vaults. In addition, approximately 55,000 sq. ft. of conventional structures are required adjacent to the fuel fabrication structure to house offices, change rooms, operator training and process demonstration, mechanical shops, utility building, warehouse, and entry portals. Accountability systems essential for use by the IAEA will be in place for the purpose of international safeguards. It is estimated that the facility will be operational for a ten- to fifteen-year period beginning in FY 2007 after which the facility will be decontaminated and decommissioned over a three to four year period.

This budget request precedes upcoming site selection and procurement decisions that will define the scope of the MOX Fuel Fabrication Facility. As a result, funds requested for facility design are based on conceptual design estimates for a new facility with existing site support infrastructure. Irradiation will take place in existing U.S. light water commercial nuclear reactors. The Title I & II funding request will not prejudice the final ROD, but helps assure that construction funding is available to support prompt implementation of preliminary design following the ROD in the spring of 1999 and continue design in FY 2000.

The Department is currently engaged in processes to select a consortium and a site for the MOX Fuel Fabrication Facility. Both decisions could affect the cost of the facility. Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design. The final baseline will be used to measure performance.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	37,803	37,803
Design management costs @ 9% of above costs	3,908	3,908
Total, design phase	41,711	41,711
Contingencies at approximately 21% of above costs		
Design phase	8,664	8,664
Total Agency Requirement (Design Only)	50,375	50,375

5. Method of Performance

The method of performance will not vary by location. A Request for Proposals was issued by the Chicago Operations Office for the procurement of a consortium to provide fuel fabrication and irradiation of MOX fuel (teaming of MOX fuel fabricator and reactor irradiation service providers). Design, construction, licensing and operation of a MOX Fuel Fabrication Facility, reactor modifications, MOX fuel design and qualification will be accomplished by the selected consortium. Costs associated with design, licensing, construction and startup of the MOX Fuel Fabrication Facility and design, licensing and retrofitting reactors to burn MOX fuel will be reflected in the final contract price. The procurement calls for a base contract with three options. The base contract covers the design and licensing of the MOX Fuel Fabrication Facility, fuel qualification program and reactor license modifications. Sequential contract options cover construction, operations and facility deactivation. It is expected that an incentive contract with the consortium will be the most appropriate and cost beneficial for the design and construction work. The construction would be through fixed price subcontracts to the extent practical, with a cost-type contract for construction management services. The MOX Fuel Fabrication Facility will be Government-owned but operated by the contractor consortium.

It is expected that during the operational phase of the consortium contract, facility operational costs will be offset by the value of the MOX fuel which will displace the low-enriched uranium (LEU) that the utilities would have otherwise purchased. The value of DOE's share of these fuel savings, less the facility operational costs, may provide a positive revenue stream to the government on a life cycle cost basis.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design Cost						
Design	0	0	28,000	12,375	10,000	50,375
Plant Engineering & Design (PE&D)	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
Total Design Costs (Federal and Non-Federal)	0	0	28,000	12,375	10,000	50,375
Other Project Costs						
R&D necessary to complete project	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project related costs	0	0	0	0	0	0
Total Other Project Costs	0	0	0	0	0	0
Total Agency Requirement (Design only)	0	0	28,000	12,375	10,000	50,375

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility Operating Costs	[b]	

8. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and Nuclear Regulatory Commission licensing standards. This facility will be NRC licensed. The preliminary total estimated cost estimates for the project include the costs of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards"; section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41 CFR 101-19.6.

[b]Related annual costs will be defined during the Title I design effort and reflected in the FY 2002 budget request.

Environment, Safety
and Health

Environment, Safety and Health

Executive Budget Summary

Mission

The Office of Environment, Safety and Health (EH) is committed to protection of Department of Energy (DOE) workers, the public, and the environment. This commitment is demonstrated by continuous improvement in program and policy development; independent oversight of the status of environment, safety, health, and safeguards and security programs; and sharing of technical resources, assistance and information. EH applies its resources to DOE activities in order to prevent accidents or injuries to workers and the public, and harm to the environment. EH is the Department's major source of expertise in disciplines such as environmental protection, nuclear safety engineering, public health, industrial hygiene, radiation protection, construction safety, epidemiology, and occupational medicine. The EH goal is to leverage resources and skilled personnel to efficiently provide DOE's line management programs with the tools and independent program assessments required to preserve safety and to effectively protect national security interests at DOE sites. Open communication, participation, and performance feedback on EH activities are integral to EH's success.

The Environment, Safety and Health program is funded in three appropriations: (1) Energy Supply, (2) Other Defense Activities, and (3) Defense Environmental Restoration and Waste Management. The Energy Supply EH program consists of: Technical Assistance, National Environmental Policy Act (NEPA), Management and Administration, and a Program Direction decision unit which includes the EH Working Capital Fund. The Other Defense Activities EH program includes: Oversight, Domestic and International Health Studies programs, Radiation Effects Research Foundation (RERF) program, and a Program Direction decision unit. In addition, the Defense Environmental Restoration and Waste Management appropriation supports an additional increment of health studies at sites where the Department's Environmental Management program conducts cleanup.

DOE has transitioned to new missions which include weapons dismantlement, environmental cleanup, and facility decontamination and decommissioning. Residual hazards at DOE facilities, especially in the nuclear weapons complex, are the result of more than 50 years of nuclear materials production and processing under less than optimum conditions, the impacts of which are still being characterized. DOE harbors the largest inventory of hazardous nuclear materials in the world outside of the former Soviet Union, as well as large quantities of hazardous chemicals. Due in large part to the sudden end of the Cold War, and the resultant rapid shutdown of the production and processing facilities, much of this material (including plutonium, spent nuclear fuel, highly enriched uranium, radioactive waste, radioactive isotopes, and hazardous chemicals) is stored in aging and deteriorating facilities, and under conditions that are in themselves hazardous. There is still a lack of reliable data for many of these facilities on the most basic safety issues, such as non-compliant electrical and ventilation systems. In addition to these challenges, the problem of secure storage of special nuclear material and classified information remains.

The EH mission is one of DOE's highest priorities. EH technical experts work with line program managers to develop tools needed to manage environment, health, and safety at DOE facilities more effectively and at less cost to taxpayers. EH has demonstrated that the Department can do its work better,

more safely, and at less cost by integrating environment, health, and safety into the planning and execution of work. EH will continue to work with its partners in the field to ensure that safety is no longer viewed as an "add-on" that produces only paper and needless cost, but as an asset that allows efficient targeting of the most urgent risks, most efficient use of limited resources, and effective accomplishment of work.

The need for effective programs to identify environment, safety, and health concerns at the project and individual activity level remains critical. Emphasis has been placed on assuring that prior commitments to fund programs to reduce environment, safety, and health concerns are met represent important accomplishments, but more remains to be done. The downsizing and realignment of the weapons production efforts will necessitate changes in the conduct of operations. In addition, the limitations on funding Environmental Management work as needs increase will create conflicts between meeting details of compliance agreements negotiated in earlier years and organizing efforts to pursue an integrated approach to risk reduction. EH's analytical products are shared DOE-wide to assist the sites in appropriate and timely resolution of identified and emerging environment, safety, and health concerns.

Mission Supporting Goals and Objectives

The EH overall major goals and objectives are as follows:

- Provide a standardized corporate independent oversight process to appraise the effectiveness of environment, safety, health and safeguards and security programs throughout DOE. To accomplish the goal of corporate independent oversight, the following objectives have been established: (1) identify, prioritize, and target Departmental needs for independent oversight; (2) incorporate DOE's guiding integrated safety management policy and principles into all oversight activities; (3) sustain a coordinated and consistent independent oversight for DOE; (4) administer an enforcement program that appropriately penalizes significant violations of nuclear safety requirements; and (5) disseminate lessons learned to reinforce good practices.
- Provide quality, timely, efficient, and effective corporate support and technical services. To accomplish this goal, the following objectives have been established: (1) provide Departmental environment, safety, and health crosscutting programs and technical services that are aligned with critical missions and integral to mission accomplishment; (2) evaluate operational performance data and identify for corporate assessment and action those vulnerabilities that pose urgent risks to DOE workers, the public, and mission accomplishment; (3) continue ongoing partnerships with private industry, government agencies, and national safety organizations to promote information exchange and program benchmarking to enhance DOE safety programs; and (4) improve corporate services through feedback and performance measures.
- Provide Departmental requirements, guidance, and policy for environment, safety and health program implementation and measurement. To accomplish this goal, the following objectives have been developed: (1) support ongoing field analysis, interpretation, and application of "WorkSmart" standards (safety guidelines) and provide needed regulatory interpretations and implementation guidance; (2) interface with outside regulators and provide comments on pending regulations pertinent to DOE and regulatory policies and actions having impact on DOE missions; (3) continue stewardship and improve effectiveness of the new environment, safety,

and health orders; and (4) develop, issue, and implement technical standards for DOE activities based on appropriate consensus standards.

- Provide a National Environmental Policy Act (NEPA) process that fosters sound Departmental planning and decision-making and builds public trust through effective process implementation. To accomplish this goal, EH has established the following objectives: (1) ensure timely and adequate completion of NEPA reviews through technical assistance, independent policy review, and approval recommendations for major programmatic environmental impact statements (EISs), site-wide and other EISs, and related NEPA documents; (2) ensure the consistency and quality of NEPA documents and increase the efficiency of NEPA personnel by determining and responding to customer needs; (3) issue guidance on selected technical and policy topics; (4) conduct workshops for Headquarters and field personnel; and (5) participate in NEPA process improvement teams and other initiatives that foster continuing improvement in the NEPA process.
- Ensure environment, safety, and health performance and management accountability. To accomplish this goal, EH has established the following objectives: (1) develop and support implementation of DOE-wide environment, safety, and health budget and planning process that defines scope, identifies costs, prioritizes activities based on relative risk, and allocates resources based on established commitments in a visible manner for implementation of environment, safety, and health program activities; (2) improve environment, safety, and health performance through the application of total quality approaches to management processes; and (3) integrate environment, safety, and health in all Departmental business functions.
- Support realignment of contract terms and conditions to incorporate environment, safety, and health management systems development needed to move towards a corporate business performance mode. To accomplish this goal, EH has established the following objectives: (1) identify ways for line program management to improve environment, safety, and health performance as part of work execution systems; and (2) integrate environment, safety, and health in all Departmental business functions.
- Conduct EH's mission in an open, trustworthy and responsive manner. To accomplish this goal, EH's objectives are: (1) establish and implement programs that strengthen the public's trust, confidence, credibility and respect in and for EH; and (2) support the Department's efforts to reduce the volume of national security information and minimize future classification.
- Promote the health and safety of DOE's workers and communities surrounding Departmental sites and reduce radiation and hazardous exposure through understanding of radiation effects and other hazards on humans. To accomplish this goal, EH's objectives are: (1) assist the field in the identification and application of effective approaches to prevent injury and illness; and (2) support the development of domestic and international health effects information on populations exposed to releases of varying levels of ionizing radiation.

The legal requirements that affect the activities of the EH organization include all environmental, safety, and health Federal regulations, as well as legislation such as the Atomic Energy Act of 1954, as amended, and the National Defense Authorization Act for Fiscal Year 1995.

Strategy

The Office of Environment, Safety and Health's (EH) intent is to assure that quality, objectivity, responsiveness and innovation are hallmarks of all EH activities.

EH's commitment to ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Department activities is our strategic objective, part of our performance agreement with the President, and a key part of the DOE Strategic Plan. To accomplish this objective, EH integrates and embeds sound environment, safety, and health management practices into the performance of DOE's day-to-day work. EH ensures that environment, safety and health priorities are clearly identified and given appropriate consideration for funding. EH is working with the Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) to evaluate the costs and benefits of external regulation of DOE safety and health activities. Pilot programs are being conducted.

Another strategic objective is to continually work with the public community in an open, frank, and constructive manner as a good neighbor and public partner. To accomplish this objective, EH fosters strong partnerships with neighboring DOE communities, regulators, and other stakeholders to determine priorities and solutions. In addition, EH increases public awareness of DOE's mission by improving the quality, timeliness, frequency, and sufficiency of information disseminated on the Department's functions, successes, lessons learned and future activities. EH focuses on developing management-level analytical products, reducing redundancies, and enhancing staff development. EH serves its principal customers in the following major areas: (1) development of Departmental environment, safety, and health requirements, guidance and interpretations that are effective and efficient to guide program implementation; (2) improvement of environment, safety and health performance and management accountability by supporting the integration of environment, safety, and health considerations into the Department's business and budget planning processes; (3) provision of critical corporate environment, safety and health support and services, including regulatory and industry interface, technical assistance to improve program management and execution, and to assist in the efficient and effective implementation of requirements; and (4) conduct independent oversight activities that provide a comprehensive status of environment, safety, health, and safeguards and security performance at DOE facilities.

One of DOE's greatest challenge is performing new types of hazardous work safely and securely at facilities that were designed to meet the requirements of outdated rules and orders. Many old, poorly-maintained facilities do not meet current building codes and safety standards. WorkSmart standards provide a graded approach to developing safety standards that allow the Department to tailor the standards to the work and the facilities. Pilot applications of this process indicate that worker safety can be enhanced while program costs are reduced.

The EH independent oversight program has been extremely useful in helping the Department effectively identify and target unacceptable risk. Comprehensive environment, safety and health evaluations provide DOE management with validated, professional appraisals of the site's performance by identifying areas of greatest risk in terms of both immediate hazards and overall program management. The foundation of this approach is an assessment of management effectiveness based on DOE's integrated safety management policy and the guiding principles of safety management contained in that policy. These assessments supply DOE management with validated, professional appraisals of the site's performance.

Using the guiding principles of safety management permits objective program analysis. Although much effort remains, changes in the Department's ability to apply resources to areas of greatest need have already been observed, and will become increasingly evident in efficiency in addressing environment, safety, health, and safeguards and security issues.

The rapid transition of the Department to a business management model with its emphasis on gaining cost-efficiencies, privatization and innovative management structures in the field has brought concomitant changes in how EH functions. Special emphasis will be given to self-assessment and self-reporting by field elements as a source of performance information, coupled with increased emphasis on EH performance analysis. Likewise, increased priority will be given to help move DOE line management from outdated environment, safety and health management approaches and systems to programs that facilitate the exchange of innovative business or environment, safety and health management practices that are preventive and cost-efficient in nature. From a technical safety assistance perspective, special emphasis will be given to urgent programmatic needs such as safely managing the decommissioning and decontamination of aging DOE facilities and hazardous waste.

EH will continue to build on its strong record of cutting costs without risking the safety and health of DOE workers, the quality of the environment, or the quality of the health studies program. Even as challenges have grown, the EH budget has been reduced by cutting administrative overhead costs and focusing on the highest priority needs. An EH staffing plan has identified the most critical functions and closely matched personnel to fit those needs. Functions of lower priority will continue to be eliminated. This will result in a cut in Federal personnel from 375 in FY 1998 to 355 in FY 1999 with 345 full-time-equivalents in FY 2000. EH has also analyzed how it utilizes support contractors and established specific criteria for their limited use. While EH has some unique national-level experts, technical contractual services continues to be more practical and cost-effective, providing a surge pool of technical expertise on an as needed basis. The evolving needs for national-level expertise in a multitude of disciplines can best be met through the use of contractors who can rapidly respond to the continually changing skill mix required of EH activities across the DOE complex.

The medical surveillance for the former workers program, required by the 1993 Defense Authorization Act, could potentially cost hundreds of millions of dollars. EH has worked during the past three years to develop a cost-effective approach that relies on feasibility studies to target populations most at risk. In FY 1996, EH awarded contracts to six consortia of universities, labor unions, and health specialists. In FY 1997, each of these consortia began conducting the feasibility assessment phases of their projects. In addition, EH issued a request for proposals for major sites not addressed as part of the first solicitation. In FY 1998, the medical surveillance phase of the first set of projects began, and the feasibility assessments for the four newly awarded cooperative agreements were initiated. In FY 1999, all ten projects will be in the implementation phase of their medical surveillance programs.

DOE, in partnership with the Department of Health and Human Services (HHS), has begun a process that will produce a strategy to include a public health agenda for each DOE site. Developed in coordination with HHS, this strategy will have clearly defined goals, objectives, and priorities for health activities to ensure that the issues of greatest concern to DOE workers and communities are addressed. All newly-funded health activities conducted by HHS will be consistent with the priorities established in this strategy.

In the Defense Environmental Restoration and Waste Management Appropriation, DOE supports public health studies in conducting a range of health-related activities. These activities are managed by EH and will be included in the public health agenda being developed in partnership with HHS.

Major Changes

The Department has consolidated the management of Health Studies in the Office of Environment, Safety and Health to provide a focal point for ensuring that the results of these efforts are used for the maximum benefit of DOE workers and communities.

The Department funds a large number and wide variety of epidemiologic and other health-related activities to address the potential effects of DOE operations on the health of DOE workers and communities. Through a Memorandum of Understanding with the Department of Health and Human Services (HHS), studies of worker and community health are funded through the Office of Environment, Safety and Health under the Other Defense Activities account, and are administered by the HHS/CDC. Prior to FY 1999, similar activities were separately funded by the Office of Environmental Management under the Defense Environmental Restoration and Waste Management Appropriation, and were independently conducted by HHS under its statutory authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Management of all HHS health studies (conducted by both CDC and ATSDR) was consolidated under EH in FY 1999.

The funding request for Public Health Activities in the Defense Environmental Restoration and Waste Management Appropriation for Fiscal Year 2000 is $20,000,000. These studies have been transferred by the Congress for the Office of Environment, Safety and Health to manage. This request could include funding for the Hanford Medical Monitoring Program and the Iodine-131 Exposure Registry, should they be incorporated into the DOE/HHS public health agenda for Hanford and base Public Health program activities at DOE sites. Should the medical monitoring program or exposure registry not be included in the Hanford health agenda for FY 2000 or be modified from current proposals, the Department will submit an appropriate Reprogramming Request.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Energy Supply					
Operating Expenses					
Technical Assistance	21,444	16,445	0	16,445	16,445
NEPA	3,000	2,552	0	2,552	2,500
Management and Administration	17,274	13,003	0	13,003	12,807
Program Direction	23,550	18,398	0	18,398	18,998
Subtotal, Energy Supply	65,268	50,398	0	50,398	50,750
Use of prior year balances	-1,897	0	-2,970	-2,970	0
Subtotal, Energy Supply	63,371	50,398	-2,970	47,428	50,750
Other Defense Activities					
Operating Expenses					
Oversight	14,015	11,700	0	11,700	12,775
RERF	14,000	14,000	0	14,000	13,500
Health Studies	45,985	41,031	0	41,031	40,956
Program Direction	20,000	24,769	0	24,769	24,769
Subtotal, Other Defense Activities	94,000	91,500	0	91,500	92,000
Use of prior year balances	-476	0	-2,108	-2,108	0
Subtotal, Other Defense Activities	93,524	91,500	-2,108	89,392	92,000
Defense Environmental Restoration and Waste Management					
Operating Expenses					
Public Health Activities[a]	0	12,000	0	12,000	20,000
Total, Environment, Safety and Health	156,895	153,898	-5,078[b]	148,820	162,750

[a]Public Health Activities funded in the Defense Environmental Restoration and Waste Management Appropriation were transferred by the Congress from EM for EH to manage in FY 1999.

[b]Allocated share of the congressionally prescribed general reductions in the Energy Supply and Other Defense Activities Appropriations to be taken from uncosted balances.

Staffing Profile

	(Whole FTEs)		
	FY 1998 Comparable Appropriation	FY 1999 Budget Request	FY 2000 Request
Full-Time-Equivalents			
Energy Supply	175	129	124
Other Defense Activities	200	226	221
Total, Full-Time-Equivalents	375	355	345

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	270	270	270	0	0.0%
Pantex	150	150	150	0	0.0%
Sandia National Laboratories	365	345	345	0	0.0%
Albuquerque Operations Office	113	65	65	0	0.0%
Total, Albuquerque Operations Office	898	830	830	0	0.0%
Chicago Operations Office					
Argonne National Laboratory	1,000	680	680	0	0.0%
Brookhaven National Laboratory	2,615	2,565	2,565	0	0.0%
Chicago Operations Office	1,748	2,050	2,050	0	0.0%
Total, Chicago Operations Office	5,363	5,295	5,295	0	0.0%
Idaho Operations Office					
Idaho National Engineering & Env Laboratory	300	300	300	0	0.0%
Radiological & Environmental Sciences Laboratory	1,400	1,400	1,400	0	0.0%
Idaho Operations Office	1,700	1,700	1,700	0	0.0%
Total, Idaho Operations Office	3,400	3,400	3,400	0	0.0%
Nevada Operations Office					
Bechtel Nevada	2,410	2,410	2,410	0	0.0%
Oakland Operations Office					
Lawrence Berkeley Laboratory	550	590	590	0	0.0%
Lawrence Livermore National Laboratory	3,738	3,730	3,730	0	0.0%
Oakland Operations Office	21,575	22,975	22,993	+18	+0.1%
Total, Oakland Operations Office	25,863	27,295	27,313	+18	+0.1%
Oak Ridge Operations Office					
Lockheed Martin Energy Systems	530	495	495	0	0.0%
Oak Ridge National Laboratory	7,525	5,190	4,990	-200	-3.9%
Oak Ridge Institute for Science & Education	5,228	4,645	4,577	-68	-1.5%
Office of Scientific & Technical Information	265	255	255	0	0.0%
Oak Ridge Operations Office	1,400	0	0	0	0.0%
Total, Oak Ridge Operations Office	14,948	10,585	10,317	-268	-2.5%
Ohio Field Office					
Fluor Daniel Fernald	25	25	25	0	0.0%
Richland Operations Office					
Pacific Northwest National Laboratory	7,793	7,300	7,300	0	0.0%
Hanford Environmental Health Foundation	50	50	50	0	0.0%
Richland Operations Office	1,861	1,480	1,480	0	0.0%
Total, Richland Operations Office	9,704	8,830	8,830	0	0.0%
Rocky Flats Field Office					
Kaiser Hill Co.	1,140	1,200	1,200	0	0.0%

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Rocky Flats Field Office	25	25	25	0	0.0%
Total, Rocky Flats Field Office	1,165	1,225	1,225	0	0.0%
Savannah River Operations Office	400	50	50	0	0.0%
All Other Sites					
Headquarters	95,092	93,953	103,055	+9,102	+9.7%
Subtotal, Environment, Safety and Health	159,268	153,898	162,750	+8,852	+5.8%
Use of prior year balances	-2,373	-5,078	0	+5,078	+100.0%
Total, Environment, Safety and Health	156,895	148,820	162,750	+13,930[a]	+9.4%

[a]The total change of $13,930,000 from FY 1999 to FY 2000 primarily results from: 1) an increase of $8,000,000 in the Defense EM Public Health Activities program (from $12,000,000 in FY 1999 to $20,000,000 in FY 2000) which Congress transferred from EM for EH to manage, and 2) the net effect of the FY 1999 allocated share of congressionally prescribed reductions in the Energy Supply and Other Defense Activities appropriation.

Program Performance Measures

EH places its emphasis on accident prevention and excellence in protecting worker and public safety and health and achieving effective environmental standards. Success will be measured by fewer radiological and toxicological contamination events, fewer abnormal operating events, and fewer procedural violations.

EH serves as the Departmental advocate for institutionalizing effective and integrated safety management, which focuses on the key tenets of work planning, hazard analysis and hazard control. Success is measured by the implementation of enhanced work planning systems at DOE sites.

EH incorporates the existing risk-based environment, safety, and health planning and budgeting process into all new major Management and Operating and Management and Integrating Contractors contracts scheduled for renewal. Success is measured by inclusion of environment, safety, and health provisions in 100 percent of the Management and Operating and Management and Integrating Contractors contracts.

EH supports the systematic collection, analysis, and sharing of data on worker illness and injury. Success is measured by the early detection of emerging health issues and the implementation of improved health and safety practices at DOE sites.

EH performs vulnerability studies to identify environment, safety, and health vulnerabilities across the complex. Success will be measured by the reduction of the number of unaddressed serious vulnerabilities at DOE facilities from the current several dozen to zero by the end of FY 2000.

EH's multi-disciplinary, fully integrated oversight process for environment, safety, health, and safeguards and security evaluations has matured. Oversight activities serve as a catalyst for improvement and bring significant issues to senior management's attention. Success will be measured by downward trends in previously identified issues that lead to environmental releases, occupational injury and illness and recurrence of accidents.

EH is implementing nuclear safety standards for work in progress that will provide for the health and safety of workers, the public and the environment. Success will be measured by the effectiveness in implementing and complying with these nuclear safety standards on a DOE-wide basis.

The field, contractors, and outside organizations continue to adopt EH standards. Success is measured by a decrease in lost work days due to occupational illness or injury, a decrease in the number of personnel contaminations with radionuclides, and a decrease in the number of serious accidents where policy is a root cause of the problem.

David Michaels, PhD, MPH
Assistant Secretary
Environment, Safety and Health

1/25/99
Date

Environment, Safety and Health Other Defense Activities

Program Mission

The Office of Environment, Safety and Health (EH) is a corporate resource that provides leadership and Departmental management excellence to protect the workers, the public, and the environment. This commitment to excellence is demonstrated by continuously striving for improvement by: developing meaningful programs and policies; conducting independent oversight of environment, safety, health, and safeguards and security performance; and providing technical assistance, resources, and information sharing. Open communication, participation, and performance feedback on EH activities from affected parties are integral to EH's success. The hallmark and highest priority of all EH activities is daily excellence in the protection of the workers, the public, and the environment. The Office of Environment, Safety and Health defense activities are concentrated into three business functions within one decision unit: Oversight, Health Studies, and the Radiation Effects Research Foundation (RERF) support; and a program direction decision unit.

Oversight activities provide information and analysis needed to ensure that the Department of Energy (DOE) and contractor management, the public, the Secretary of Energy, and the Assistant Secretary for Environment, Safety and Health have an accurate, comprehensive understanding of the effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, and safeguards and security policies and programs. These activities include the EH Residents program, Independent Evaluations, Accident Investigation, Analysis, Price-Anderson Amendments Act Enforcement, and the Departmental Representative to the Defense Nuclear Facilities Safety Board (DNFSB).

Health Studies activities include Occupational Medicine (medical surveillance); Epidemiologic Studies (surveillance and communication of worker injury and illness); Public Health Activities (health studies, health education and promotion, etc., at DOE sites); and International Health Programs (Marshall Islands program and health studies in the former Soviet Union).

Radiation Effects Research Foundation (RERF) activities DOE supports analysis of the medical effects of radiation with the intention of contributing to the maintenance of the health and welfare of atomic bomb survivors and to the enhancement of worldwide radiation protection practices and standards.

Program Goal

The goal of the EH Defense activities is to continually provide excellent Department-wide environment, safety, health, and safeguards and security support to:

- Provide consistent, multidisciplinary, credible independent oversight processes for evaluating the effectiveness of environment, safety, health, and safeguards and security programs.
- Promote actions that prevent recurrence of worker injuries, property damage and environmental damage due to accidents.

- Coordinate processes with field and program offices and report evaluation results to DOE senior management, the Congress, and the Defense Nuclear Facilities Safety Board.
- Ensure initiatives relative to environment, safety, health, and safeguards and security throughout the complex are analyzed and disseminated as appropriate.
- Ensure that follow-up and corrective actions for all EH oversight activities are effective.
- Ensure increased contractor accountability for safety through oversight of the Price-Anderson Amendments Act.
- Promote high quality workplace medical services to DOE and contractor employees.
- Use epidemiologic analysis and public health activities to examine associations between exposures or conditions at DOE sites and potential adverse health effects among groups of workers and offsite populations to develop appropriate public health responses.
- Manage the health and environmental programs in the Marshall Islands for those exposed to ionizing radiation.
- Expand the knowledge of dose-response relationships of health effects of radiation using workers and populations with unique exposure to radiation as a result of accidents or environmental contamination in the former Soviet Union.
- Continue United States participation in support of the Radiation Effects Research Foundation.

Program Objectives

- Identify, prioritize, and conduct evaluations to determine the effectiveness of the Department's environment, safety, health, and safeguards and security policies and programs by providing coordinated and consistent independent oversight to customers.
- Report evaluation results to DOE senior management, the Congress, and the Defense Nuclear Facilities Safety Board.
- Provide information to line management that helps improve the performance and effectiveness of the Department's Federal workforce and contractor employees in matters related to environment, safety, health, and safeguards and security.
- Conduct and/or monitor accident investigations with a focus on identifying systemic causes so that further accidents can be prevented.
- Encourage contractors to voluntarily comply with nuclear safety requirements by encouraging proactive contractor initiatives to identify deficiencies before actual problems occur.
- Collect, analyze and disseminate lessons learned and exemplary practices to improve performance and technical safety.

- Support the systematic collection, analysis, and sharing of data on worker injury and illness with the intent of detecting emerging health issues and evaluating the impacts of changes in health and safety practices at DOE sites.
- Develop and implement, in partnership with the Department of Health and Human Services, a consolidated and coherent strategy for public health activities at DOE sites, which includes a public health agenda for each site.
- Investigate the effects of radiation exposure on the exposed populations in the Marshall Islands.
- Investigate the effects of radiation exposure on the children and workers exposed by the Chernobyl accident and exposed populations in the former Soviet Union.
- Collect and analyze data on the effects of radiation exposure on the survivors of the bombings of Hiroshima and Nagasaki, Japan.
- Support studies to assess the health of the DOE workforce and of populations living near DOE sites in order to determine whether worker or community health has been negatively impacted by DOE operations and disseminate findings.
- Identify, address, resolve, and close management and technical issues in order to ensure protection of public health and safety.
- Provide information to line managers that helps to improve the performance and effectiveness of the Department's workforce and contractor employees in matters related to environment, safety, health, and safeguards and security.
- Provide occupational and environmental health information to DOE workers, DOE communities and the general public.

Performance Measures

Performance measures are primarily qualitative rather than quantitative. However, some performance measures are:

- Downward trends in the numbers of previously identified environmental releases that reoccur.
- Decreased rates of occupational injury and illness.
- Downward trends in the recurrence of accidents.
- Increased customer satisfaction with oversight priorities, timeliness, consistency, and quality.
- Significant reductions in recurrence of environment, safety, health, and safeguards and security issues.
- Decreased radiological exposures and number of nuclear safety violations.
- Identification of at-risk worker populations and employment of appropriate mitigation measures to avoid adverse health outcomes by implementing a program that will establish systematic linkages between job and task analyses, exposure assessments, medical monitoring, and

epidemiological analysis. Continue shift from a reactive approach to emphasizing excellence and prevention in protecting worker and public safety and health.

- Initiation of investigation of reported health concerns within 30 days of identification.
- Satisfaction of former workers that issues surrounding their potential for occupationally-related disease are being addressed.
- Reduced number of outstanding actions and commitments for resolving environmental, health and safety issues identified by the Defense Nuclear Facilities Safety Board.
- Through studies of international populations, increased information defining the relationship between ionizing radiation dose and its effect on human health.
- Increased stakeholder satisfaction with access to information on DOE public and occupational health initiatives.
- Through studies of DOE community and worker population, increased information defining the relationship between exposures resulting from DOE facility operations and their effects on human health

Significant Accomplishments and Program Shifts

The Department has consolidated the management of Health Studies in the Office of Environment, Safety and Health to provide a focal point for ensuring that the results of these efforts are used for the maximum benefit of DOE workers and communities. The funding for these programs continues to be split between the Other Defense Activities and the Defense Environmental Restoration and Waste Management appropriations.

Significant Accomplishments and program shifts are defined within the respective business line description that follows.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Other Defense Activities					
Operating Expenses					
Oversight	14,015	11,700	0	11,700	12,775
Health Studies[a]	45,985	41,031	0	41,031	40,956
RERF	14,000	14,000	0	14,000	13,500
Program Direction	20,000	24,769	0	24,769	24,769
Subtotal, Other Defense Activities	94,000	91,500	0	91,500	92,000
Use of prior year balances	-476	0	-2,108[b]	-2,108	0
Total, Other Defense Activities	93,524	91,500	-2,108	89,392	92,000

Public Law Authorization:
Public Law 83-703, "Atomic Energy Act of 1954"
Public Law 100-408, "Price-Anderson Amendments Act of 1988"

[a]In addition, Public Health Activities were funded ($12 million in FY 1999 and $20 million in FY 2000) in the Defense Environmental Restoration and Waste Management Appropriation.

[b]Allocated share of the congressionally prescribed general reduction in the Other Defense Appropriation.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Pantex	150	150	150	0	0.0%
Sandia National Laboratories	185	185	185	0	0.0%
Los Alamos National Laboratory	270	270	270	0	0.0%
Albuquerque Operations Office	113	65	65	0	0.0%
Total, Albuquerque Operations Office	718	670	670	0	0.0%
Chicago Operations Office					
Brookhaven National Laboratory	1,810	1,810	1,810	0	0.0%
Chicago Operations Office	500	600	600	0	0.0%
Total, Chicago Operations Office	2,310	2,410	2,410	0	0.0%
Idaho Operations Office					
Idaho National Engineering & Env. Laboratory	150	150	150	0	0.0%
Nevada Operations Office					
Bechtel Nevada	2,410	2,410	2,410	0	0.0%
Oakland Operations Office					
Lawrence Berkeley Laboratory	40	40	40	0	0.0%
Lawrence Livermore National Laboratory	3,153	3,200	3,200	0	0.0%
Oakland Operations Office	20,725	21,800	21,800	0	0.0%
Total, Oakland Operations Office	23,918	25,040	25,040	0	0.0%
Oak Ridge Operations Office					
Oak Ridge Institute for Science & Education	2,508	2,600	2,600	0	0.0%
Oak Ridge National Laboratory	230	480	480	0	0.0%
Oak Ridge Operations Office	1,400	0	0	0	0.0%
Total, Oak Ridge Operations Office	4,138	3,080	3,080	0	0.0%
Ohio Field Office					
Fluor Daniel Fernald	25	25	25	0	0.0%
Richland Operations Office					
Pacific Northwest National Laboratory	3,813	4,000	3,400	-600	-15.0%
Hanford Environmental Health Foundation	50	50	50	0	0.0%
Richland Operations Office	1,661	1,300	1,300	0	0.0%
Total, Richland Field Office	5,524	5,350	4,750	-600	-11.2%
Rocky Flats Field Office					
Kaiser Hill Co.	1,140	1,200	1,200	0	0.0%
Rocky Flats Field Office	25	25	25	0	0.0%
Total, Rocky Flats Field Office	1,165	1,225	1,225	0	0.0%
Savannah River Operations Office	400	50	50	0	0.0%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
All Other Sites					
Headquarters	53,242	51,090	52,190	+1,100	+2.2%
Subtotal, Defense	94,000	91,500	92,000	+500	+0.5%
Use of prior year balances	-476	-2,108[a]	0	+2,108	+100.0%
Total, Defense	93,524	89,392	92,000	+2,608	+2.9%

[a]Allocated share of the Congressionally prescribed general reduction in the Other Defense Activities appropriation.

Site Description

Albuquerque Operations Office

Albuquerque Operations Office is located on Kirtland Air Force Base in Albuquerque, New Mexico. The primary mission continues to be stewardship and maintenance of the Nation's nuclear weapons stockpile. In addition to the national security mission, the Operations Office also devotes significant resources to restoring and improving the environmental quality of operations. Albuquerque participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL), located in the town of Los Alamos approximately 35 miles northwest of Santa Fe, New Mexico, is a national resource for solving complex scientifical problems. LANL provides materials to communicate beryllium health risks and assists in the development of a test for screening of chronic beryllium disease through the collection and transmission of worker health, exposure, and demographic data at the site.

Pantex Plant

Pantex Plant, located on a 16,000-acre site on the High Plains of the Texas Panhandle, northeast of Amarillo, Texas, is America's only nuclear weapons assembly and disassembly facility. Pantex participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Sandia National Laboratories

Sandia National Laboratories' main laboratory is located on Kirtland Air Force Base in Albuquerque, New Mexico. Sandia participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Chicago Operations Office

Chicago Operations Office, Chicago, Illinois, is responsible for overseeing the operation of contractor-operated, multi-program laboratories such as Argonne National Laboratory, near Chicago, and Brookhaven National Laboratory. Technical support is provided to the Headquarters staff for the Departmental Representative to the Defense Nuclear Facilities Safety Board (DNFSB). The representative coordinates and tracks the resolution of findings and recommendations from the DNFSB.

Brookhaven National Laboratory

Brookhaven National Laboratory is located in Upton, New York on Long Island. As a non-defense research institution, BNL is dedicated to basic and applied investigation in a multitude of scientific

disciplines. BNL participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site and provides support to the EH medical line management program.

Idaho Operations Office

Idaho Operations Office, Idaho Falls, Idaho, uses applied engineering to clean up the cold war legacy, execute multi-program missions, and the Idaho National Engineering and Environmental Laboratory's expertise with emerging technology to meet the Nation's needs.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) is located 44 miles outside of Idaho Falls, Idaho. Lockheed Martin Idaho Technologies Company, as the prime contractor, participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Nevada Operations Office

Nevada Operations Office, Las Vegas, Nevada, oversees and takes responsibility for the operations and programs of the Nevada Test Site. DOE Nevada maintains the capability at the Nevada Test Site and other facilities and sites to implement DOE initiatives in stockpile stewardship, crisis management, waste management, environmental, safety, and health management and programs, as well as supporting other DOE programs.

Bechtel Nevada

Bechtel Nevada manages operations at the Nevada Test Site and its related facilities and laboratories. Bechtel Nevada participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site and provides logistical support for medical care delivery to the Rongelop and Utirik exposed populations in the Marshall Islands.

Oakland Operations Office

Oakland Operations Office, Oakland, California, has multi-program expertise in the following areas: national security; environment, safety and health; and biomedical/environmental sciences. Oakland's core competencies to support the success of these programs include: program/project execution; laboratory contract management; environment, safety, health, and safeguards and security oversight; and business operations support. Oakland provides technical assistance in awarding grants and cooperative agreements in support of the Marshall Islands medical program, the Former Workers Program, and the International Health Studies program (i.e., Radiation Effects Research Foundation, Marshall Islands, and dosimetry studies).

Lawrence Berkeley Laboratory

Lawrence Berkeley Laboratory, Berkeley, California, pursues basic and applied research that advances the frontiers of science and solves a broad spectrum of national problems. It is a multi-program laboratory that serves the Nation's needs in technologies and environment, safety and health activities. Lawrence Berkeley Laboratory provides continuing support for the Comprehensive Epidemiologic Data Resource project.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is located in California's Tri-Valley region east of San Francisco provides continuing support to the Marshall Islands program by providing environmental sampling and analysis to determine the radiological conditions at the affected atolls.

Oak Ridge Operations Office

Oak Ridge Operations Office, Oak Ridge, Tennessee, is responsible for research and development, defense programs, environmental management, and environment, safety and health activities. There are three major plant complexes on the Oak Ridge Reservation: Oak Ridge National Laboratory; Y-12 Plant; and the East Tennessee Technology Park, as well as the Oak Ridge Institute for Science and Education and the American Museum of Science and Energy.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE) is a Department of Energy facility managed and operated by Oak Ridge Associated Universities. It is a resource for science education programs to train the workforce in health, safety, and security, emergency preparedness and response, and radiological site characterization activities. ORISE also provides technical expertise to the follow-up study of beryllium workers throughout the DOE complex; provides EH support to REAC/TS (Radiation Emergency Accident Center/Training Site); and support to the Former Workers program. ORISE will also support the medical monitoring of former radiation workers at Rocky Flats.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL), Roane County, Tennessee, is a multi-program science and technology laboratory. Scientists and engineers at the laboratory participate and support environment, safety, and health activities; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. ORNL assists with the beryllium rulemaking task that was begun in FY 1998.

Ohio Field Office

Ohio Field Office is comprised of the Fernald Area Office, the Miamisburg Area Office, the West Valley Area Office, the Ashtabula Area Office, the Columbus Area Office, and the Ohio Support Office (also

located at Mound Plant in Miamisburg, Ohio). The Ohio Field Office develops strategies to control lost-time accidents and worker's compensation claims, and implements a team approach to ensure a safe work ethic. The Ohio Field Office is responsible for environmental restoration, waste management, and other programmatics at its four area offices. The Ohio Field Office ensures that the environment and the health and safety of DOE employees, contractor employees, and the general public are protected.

Fluor Daniel Fernald

Fluor Daniel Fernald is a global engineering, construction and diversified services corporation located in Cincinnati, Ohio. In August 1992, DOE awarded Fluor Daniel Fernald a five-year cleanup contract with a two-year contract extension in December 1997. The company is responsible for managing Fernald's environmental restoration activities, including managing existing waste, as well as any waste generated during cleanup activities, and the safe handling and processing of raw materials and products resulting from past operations at Fernald. This includes all environment, safety and health activities. The company participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Richland Operations Office

Richland Operations Office, Richland, Washington, manages waste products; develops, applies, and commercializes technologies; manages environment, safety and health activities; and supports cleanup and environmental restoration. Richland also provides technical support to the U.S. Transuranium Registries for the study of biokinetics of transuranium radionuclides in humans to evaluate high priority cases and publish results of radiochemical analyses, and supports international health study efforts.

Hanford Environmental Health Foundation

Hanford Environmental Health Foundation (HEHF), Richland, Washington, provides occupational health services through health risk management and occupational health services to personnel at Hanford. Through these services, HEHF strives to maximize the health and safety of Hanford personnel while minimizing personnel and occupational heath risks. HEHF participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL), Richland, Washington, develops and delivers new and effective environment, safety and health technologies. PNNL also provides technical support in preparing policies, procedures, and guides, as well as developing materials that address the oversight process and protocols that are used for program implementation, planning, analysis of evaluation results and trends, and compilation of policy issues related to the evaluations. PNNL also provides technical support for recurring safety management evaluations, safeguards and security inspections, as well as site profile development, accident investigations, and other special studies and reviews. PNNL also assists in tracking and trending corrective action, developing and disseminating lessons learned, and tracking issues related to the program for follow-up and analysis. PNNL provides support to the epidemiologic

surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site, and the international health studies program.

Rocky Flats Field Office

Rocky Flats Field Office, Golden, Colorado, is responsible for managing waste and materials, cleaning up and converting the Rocky Flats Environmental Technology Site to beneficial use in a manner that is safe, environmentally and socially responsible, physically secure and cost-effective. The Rocky Flats Office supports the Beryllium Workers Health Surveillance Program and the Former Radiation Worker Surveillance Program including screening and diagnostic medical evaluations for chronic beryllium disease to former employees participating in the program.

Kaiser-Hill Company

Kaiser-Hill Company, Golden, Colorado, is responsible for the management of the Rocky Flats site and team integration. The company participates in the epidemiologic surveillance program through the collection and transmission of worker health, exposure, and demographic data at the site.

Savannah River Site

Savannah River Site, Aiken, South Carolina, is responsible for serving the national interest by ensuring that programs, operations and resources are managed in a safe, open and cost-effective manner to: support current and future national security requirements; reduce the global nuclear proliferation danger; protect and restore the environment while managing waste and nuclear materials; and conduct mission-supportive research and technology development. Savannah River Operations provides technical support to the epidemiologic surveillance program through collection and transmission of worker health, exposure, and demographic data at the site.

All Other Sites - Headquarters (Includes Commercial Contracts, Other Federal Agencies, and Universities)

The evolving short term needs for national-level expertise in a multitude of disciplines can best be met through the use of contractors who can rapidly respond to the continually changing skill mix required of EH across the DOE complex. Contract support is also more practical and cost-effective to provide a surge pool of technical expertise effectively and efficiently. In addition, contractors provide legal, technical, and analytical services to support the investigation of alleged violations of the Price-Anderson legislation.

Contractors also provide technical expertise in conducting oversight activities at DOE facilities. These activities include inspections, safety management evaluations, safeguards and security evaluations, special studies, site profiles, and analyses utilizing specialized technical expertise to obtain an appropriate skill mix and surge capability.

Under a Memorandum of Understanding, the Department of Health and Human Services provides support to DOE in health studies of DOE workers and communities around DOE sites. Wire payments are made to various agencies and institutions of the former Soviet Union to continue work performed by the International Health Studies office.

Oversight

Mission Supporting Goals and Objectives

The mission of the independent Oversight program is to provide the information and analysis needed to ensure that the Secretary of Energy, Assistant Secretary for Environment, Safety and Health, Department and contractor management, Congress, workers, unions, and the public have an accurate and comprehensive understanding of the effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, safeguards and security policies and programs. The primary goal of the Office of Oversight is to be a catalyst that promotes constructive change in the Department's environment, safety, health, safeguards and security management programs. This goal is accomplished by: providing an independent evaluation and analysis of the status of environment, safety, health, safeguards and security programs; accurately reporting the status to DOE managers and other constituents; and conducting timely follow-up activities to validate that appropriate corrective actions are being taken.

The Office of Oversight conducts independent assessments that are reported directly to DOE senior management and Congress. These reviews are a critical aspect of DOE's ability to verify that it can protect the environment, workforce, and public. The reviews can be a key factor in DOE management decisions about contracts or the future of DOE facilities (e.g., the decision to terminate the Brookhaven contract). Accordingly, the independent oversight mission receives intense scrutiny and must perform with a high level of excellence. Therefore, it must use national-level experts that have unquestioned credentials for its ongoing inspection and evaluation efforts.

In essence, the Office of Oversight needs the technical support of national-level experts that are at least comparable to Federal personnel at the excepted service level. While EH has some unique, national-level experts, only a few are available to support oversight activities. Further, because of the nature of the activities, contract support continues to be more practical and cost-effective to provide a surge pool of technical experts than expanding the Federal oversight staff for a number of reasons:

- Peak loads associated with onsite inspections make it more effective and efficient to use contractor personnel who are tasked only when needed.
- The need for evaluators with national-level expertise in over 50 different technical disciplines (ranging from industrial hygiene to nuclear material control and accountability) is more efficiently provided by contractors. The needs for various technical expertise are continually evolving and frequently change as new needs are identified (e.g., the Brookhaven tritium contamination prompted a need for expert-level groundwater modeling personnel). Such evolving needs can best be met through use of contractors as the Federal staff and personnel systems are unable to rapidly respond to the continually changing skill mix.

Similarly, because of the nature of Oversight activities and the intense scrutiny that Oversight is under, Oversight reviews must be performed in a manner that is demonstrably unbiased. A critical aspect of an unbiased review is that Oversight's personnel must be able to participate without even the perception of a conflict of interest. The EH staff (i.e., non-Oversight staff) perform technical assistance activities and thus have a significant potential bias in that they would be in the position of evaluating their own work

and/or advice. Such conflicts of interest present a significant problem to using EH staff to support Oversight assessments.

The mission of the independent oversight program is accomplished through the following key activities:

EH Residents provide real time feedback on the status of field environment, safety, health, safeguards and security programs. The EH Residents evaluate performance through a comprehensive surveillance program, follow-up and verify closure of identified deficiencies, and provide regular updates on the status of corrective actions and upgrades.

Evaluations of environment, safety, health, safeguards and security policies and implementation of policies by DOE line management organizations are performed. Evaluations are an independent assessment of Departmental performance against orders, standards, policies, and other pertinent regulations, with a particular emphasis on DOE line management performance with respect to the Department's integrated safety management policy.

Accident Investigation Program ensures that accidents occurring at DOE sites are adequately investigated such that root causes are determined, lessons learned are disseminated, and corrective actions are implemented and verified. The Office of Oversight conducts systematic investigations of the most serious (Type A) accidents and guides and monitors the conduct of less serious accidents (Type B) that are performed by the field elements. The Office of Oversight also provides guidance for performing investigations and performs analysis of trends and precursors.

Analysis ensures the integrated collection, analysis, and dissemination of results of oversight activities. The oversight analysis activity analyzes data obtained from oversight evaluations, provides the information necessary to plan and schedule evaluation efforts, and maintains the supporting infrastructure elements to ensure that adequate follow-up is performed at DOE sites.

Enforcement provides oversight of the Price-Anderson Amendments Act enforcement activities of the Department. This primarily includes conducting investigations and technical evaluations of DOE contractors performing nuclear operations at DOE sites that are indemnified under the Price-Anderson Amendments Act. Contractors are encouraged to be proactive in identifying and correcting nuclear safety deficiencies to minimize enforcement actions.

Defense Nuclear Facilities Safety Board (DNFSB) Liaison provides effective cross-organizational leadership in resolving Board-related technical and management issues necessary to ensure public health and safety. This office represents the Secretary in regular and continuing interactions with the Board, and advises the Secretary, Deputy Secretary, Under Secretary, Secretarial Officers, and other Department Executives of the Board's priorities, concerns, actions and plans.

The following commitments made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy have been accomplished:

- Through independent oversight, provide information and analysis of the effectiveness, vulnerabilities, and trends of the Department's ES&H and safeguards and security policies and programs to the Secretary and senior line management.
- Consider stakeholder concerns in formulating oversight evaluations; and provide stakeholders with the result of EH's independent oversight studies.

Significant Accomplishments

EH Residents

- The EH Residents continue to collect beneficial data from numerous sources and at sites they are assigned to monitor. They consistently tour the facilities, respond to events, identify safety concerns, provide real-time updating, and communicate with line management. They have performed over 200 comprehensive EH Resident surveillances and follow-up activities, including following up on occurrence reports, accident investigations, and Office of Oversight evaluations, reviews and special studies. The process has matured and developed which leads to efficiencies in operations. (FY98: $500; FY99: $350; FY00: $350)
- Develop methods and procedures for collecting, collating, evaluating, and retrieving data in the field. The EH Residents have well-developed procedures and processes that define how they do business. This included the development of an "issues tracking system" designed to track issues identified as the result of EH Residents surveillance activities, occurrence reports, accident investigations, and Office of Oversight evaluation and review activities. (FY98: $100; FY99: $50; FY00: $50)
- Provide information to DOE management on problem areas by performing special reviews, such as the EH Residents review of radiation protection effectiveness across the Department's complex. Perform other special reviews as needed to increase the effectiveness of EH Residents oversight and follow-up of issues identified as the result of Office of Oversight activities. (FY98: $100; FY99: $100; FY00: $100)
- Provide input to the 20 site profiles maintained by the Office of Oversight. The profiles are updated twice each year and validated with field managers by the EH Residents to ensure accuracy. The profile updating process, which includes EH Residents participation, provides a consistent and uniform approach for maintaining an accurate and current profile of the status of hazards, strengths, weaknesses, and upgrades at key DOE facilities. Additionally, the profiles provide a basis for DOE-wide priorities and focus assessments on significant problems and trends. This was the first comprehensive compendium of environment, safety, and health issues at DOE facilities. The process has matured and streamlined for cost-effective operations.
  - Subsequent efforts provided field-validated input to site profiles for additional facilities and expanded the scope to include safeguards and security issues.
  - Continued monitoring field activities, participated in planning and conduct of comprehensive evaluations, and provided input to maintain the site profiles. Published the weekly summary of major EH Residents issues provided to senior DOE managers and to the Secretary of Energy's staff. Continued follow-up activities to ensure DOE managers have current and validated information. Program recognized complex-wide as an important element in a comprehensive system of oversight, site profiles, monitoring, follow-up, and continual updating of status. (FY98: $200; FY99: $100; FY00: $100)

Evaluations

- Conduct environment, safety, and health (ES&H) evaluations consisting of reviews of 4-6 major sites per year using the integrated safety management system policy and the safety management template as a framework for evaluating line management performance. Promote improvements in line management, reliability of safety systems, and programs essential to ES&H. Evaluations have identified and continued to identify significant, systemic ES&H vulnerabilities. They have provided a clear, positive benefit to the Department through safety risk and liability reduction, significant cost reductions, and the elimination of unwise expenditures. These evaluations are the Department's comprehensive and integrated approach to internal independent oversight of DOE and contractor line management. (FY98: $3,100; FY99: $3,100; FY00: $3,100)
- Conduct an ongoing program of safeguards and security evaluations and site profiles of major sites each year, which determines the effectiveness of the protection of nuclear weapons components, special nuclear material, and classified and sensitive information. Through the development of safeguards and security profiles, the Office of Oversight has maintained a comprehensive baseline of safeguards and security programs throughout the Department. By applying the guiding principles of safety management, safeguards and security evaluations and site profiles have been enhanced. (FY98: $1,900; FY99: $1,900; FY00: $1,900)
- Perform special reviews and studies of policies, programs, and their implementation in the field to identify program an be corrected. Streamlining of operations has produced cost effective results. (FY98: $1,100; FY99: $1,000; FY00: $1,000)
- Continue to conduct the first systematic follow-up program designed to determine the effectiveness of actions taken to correct weaknesses identified as the result of oversight evaluations or resulting from accident investigations. Particular attention is placed on sites previously identified as having significant ES&H problems, such as Los Alamos, Brookhaven, Rocky Flats, and Hanford. Follow-up activities are particularly important in implementing accountability of line management for ES&H performance and in protecting the environment and ensuring the safety and health of workers and the public. Data from this program are used to develop site profiles for senior DOE managers in site-specific decisionmaking. Procedures for follow-up activities have been re-vamped for efficiency and conduct of operations. (FY98: $3,300; FY99: $2,200; FY00: $2,200)
- Continue the qualification standards program. Office of Oversight personnel achieved greater than 90 percent of the qualification standards during the first year. Personnel development and requalification programs are ongoing. (FY98: $240; FY99: $150; FY00: $150)
- Continue the certification program for safeguards and security personnel by administering challenging certification tests designed to demonstrate safeguards and security topical knowledge and the ability to apply that knowledge to real-world problems. (FY98: $100; FY99: $100; FY00: $100)
- Continue to revise and refine evaluation methods and procedures that focus on the principal elements of the integrated safety management program that include line management accountability, clear roles and responsibilities, technical competence, balanced priorities, identification of safety standards and requirements, hazard controls, and operations authorization.

This also includes the dissemination of useful tools to increase the effectiveness of field programs. (FY98: $400; FY99: $350; FY00: $350)

- Conduct an ongoing program of environmental audits in compliance with the Executive Order, "Greening the Government Through Leadership Environmental Management." As part of this compliance audit function, facility level environmental regulatory audits, routine environmental regulatory compliance audits, environmental management systems audits, audits of compliance with toxic release inventory reporting and emergency planning and reporting requirements will all be conducted. (FY98:$00; FY99: $00; FY00: $800)
- Develop and maintain a safety management template and a comprehensive set of performance objectives and criteria that consistently promote and reinforce effective application of the safety management principles. The template, performance objectives and criteria are periodically updated and enhanced to increase the effectiveness of the Office of Oversight evaluation program. (FY98: $100; FY99: $100; FY00: $100)

Accident Investigation Program

- Conduct Type A accident investigations at DOE facilities. This is accomplished with a focus on management systems to achieve the ultimate objective of preventing accidents and injuries. Continue streamlining and enhancing the accident investigation program to be more effective in reducing accidents (e.g., reports that focus on lessons learned) and more useful to management (e.g., streamlined reporting procedures that result in more concise reports in a shorter period of time). Continue to update policies and procedures and to enhance the investigative process. (FY98: $100; FY99: $100; FY00: $100)
- Continue a program to present accident investigation techniques, revise methods for implementing the accident investigation program, develop functional program materials for DOE Headquarters and field personnel, identify precursors to accidents including a review of the Type B accident investigations performed by the field, disseminate lessons learned, and follow-up on corrective actions. (FY98: $200; FY99: $200; FY00: $200)

Analysis

- Develop and maintain a core analysis capability solely dedicated to the analysis of data collected by Office of Oversight activities and available from Departmental databases and other sources. It includes subject matter expertise, policy analysis, coordination of follow-up efforts, data analysis, and reporting (including annual reports and special papers). Provide analytical information to keep the Office of Oversight, DOE Headquarters, and field managers informed and, ultimately, to help improve ES&H and S&S programs at DOE facilities. Identify trends and issues that are beneficial to the Office of Oversight in its evaluation planning and scheduling efforts. The process has matured and developed providing efficiencies of operations. (FY98: $650; FY99: $400; FY00: $400)
- Develop a program infrastructure that provides for an effective independent oversight program, including policies and procedures, handbooks, information management systems, and tools. Develop an electronic document management and tracking system that provides for retention,

storing, and tracking of Office of Oversight documents, as well as linkage to DOE information databases and other information sources. (FY98: $100; FY99: $100; FY00: $100)

- Develop a comprehensive certification program, including office-specific qualification program standards, and appraisal analysis of management systems. Program has been developed. (FY98: $150; FY99: $0; FY00: $0)
- Develop 20 site profiles. Update and disseminate the site profiles based on input from EH Residents, Office of Oversight evaluations and reviews, and other sources. The Office of Oversight ensures that the most significant issues and findings at all key sites, and the status of their corrective actions, are documented in the site profiles. The site profiles are revised twice each year. (FY98: $100; FY99: $100; FY00: $100)

Enforcement

- In cooperation with DOE Field and Program Offices, conduct the Price-Anderson Amendments Act Enforcement program at each DOE nuclear site and perform nuclear safety enforcement activities. Perform Price-Anderson-related investigations and technical evaluations of DOE nuclear safety requirements involving DOE indemnified contractors utilizing a process that provides for an orderly transition to an external enforcement regulator in the future. Encourage contractors to proactively identify and correct nuclear safety deficiencies using an enforcement approach similar to the commercial nuclear industry. Iincreased on-site reviews need to be conducted for a more robust nuclear safety enforcement program. (FY98: $975; FY99: $800; FY00: $975)

Defense Nuclear Facilities Safety Board Liaison

- Coordinate the Board recommendation process through line organizations by developing responsive implementation plans, resolving technical and management issues, completing commitments, and ultimately closing recommendations. Historically, the Department receives 4-5 major Board recommendations each year and is actively working 15-20 open recommendations. Also, the Board activities and actions will increase. (FY98: $200; FY99: $150; FY00: $200)
- Manage the Department's interface activities and provide direction and advice to line managers on Board-related matters. Participate in, and manage preparation and follow-up for over 300 annual meetings and site visits between Department staff and Board staff. (FY98: $150; FY99: $150; FY00: $150)
- Coordinate responses to Board reports and inquiries. Manage the Department's Safety Issues Management System (SIMS) for Board-related issues, commitments, and actions, which tracks over 1000 Department commitments and actions related to Board recommendations and other correspondence. (FY98: $100; FY99: $100; FY00: $100)
- Maintain the Department's central repository of official Board communications and make this information available to Department and contractor personnel complex-wide. Annually, 250-350 pieces of Board/Department correspondence are received and addressed. This information is available to the public on the Internet. Over 1400 pieces of Board/Department correspondence

are available on the web site in multiple file formats for customer convenience. Documents are posted in 1-3 business days to facilitate action. The Board activities and actions will increase. (FY98: $150; FY99: $100; FY00: $150)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
EH Residents	900	600	600	0	0.0%
Evaluations	10,240	8,900	9,700	+800	9.0%
Accident Investigation	300	300	300	0	0.0%
Analysis	1,000	600	600	0	0.0%
Enforcement	975	800	975	+175	+21.9%
DNFSB Liaison	600	500	600	+100	+20.0%
Total, Oversight	14,015	11,700	12,775	+1075	9.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
EH Residents			
■ The primary functions of the EH Residents, comprehensive and systemic surveillances and follow-up activities of evaluation results, are well established. They provide the day-to-day, real time monitoring of environment, safety, and health (ES&H) and safeguards and security (S&S) activities at the sites, as well as the follow up of corrective actions associated with previously identified issues and deficiencies. Experience since late 1994 and the application of zero-based budgeting procedures have demonstrated that this funding level is appropriate with increased efficiencies in operations. These on-site functions of data collection will continue to be key to the independent oversight program well into the future. Particularly with regard to the performance measures, increased customer satisfaction relative to timeliness, consistency, quality, and the reduction in recurrence of ES&H and S&S issues. Environment, safety, and health are identified as one of the three areas critical to the success of the Department's business lines identified in its strategic plan	500	350	350
■ To accomplish its mission, the Office of EH Residents have developed methods and tools to collect data and provide for real-time updating of issues. An "issues tracking system" was developed early on and, through experience, has proven to be invaluable. Other methods and procedures utilized in the Resident program are well developed, such as surveillances which coincide with major site issues working with the Field Managers. This funding level is considered appropriate for sustaining and continuing to improve these important operational mechanisms. The funding level was primarily derived through experience and zero-based budgeting techniques. The methods and procedures for collecting data are key to effective mission accomplishment and, in turn, help ensure the safety and health of workers and the public	100	50	50

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Special reviews conducted by the EH Residents have provided important insights for the independent oversight program and for the DOE. By pooling their collective knowledge and experience, the Residents are particularly qualified to conduct special reviews in the field which will become even more important in the future as the program continues to improve. These reviews, which are topical in nature like the radiation protection special review requested by the Defense Nuclear Facilities Safety Board, along with the follow-up activities, are considered essential. The funding level is considered appropriate and was derived through recent experience–radiation protection reviews and a review of the Department's Computerized Accident/Injury reporting system (CAIRS)–and zero-based budgeting techniques. These functions are directly linked to the performance measures, particularly decreased radiological exposures and number of nuclear safety violations, and the decreased rates of occupational injury and illness. These also are important objectives outlined in the EH strategic plan.	100	100	100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide field input to the Office of Oversight site profiles that provide a consistent and uniform approach for maintaining an accurate and current profile of the status of hazards, strengths, weaknesses, and upgrades at key DOE facilities. Provide a basis for DOE-wide priorities and focus assessments on significant problems and trends. In subsequent efforts, provide field-validated input to site profiles for additional facilities and expand the scope to include safeguards and security issues. Development and semiannual updating is one of the most important Office of Oversight innovations, and the EH Residents provide the most important means of obtaining accurate information for maintaining the site profiles. The profiles are recognized Department-wide and have become an important tool in effectively accomplishing the independent oversight mission. Therefore, the funding level is considered appropriate in maintaining this important effort and increasing its effectiveness in the years to come. The funding level was determined through extensive experience in producing the 20 profiles (i.e., obtaining data, updating, validating the profiles with the field, and publishing) and in comparison with mission requirements and other oversight products to ensure cost-effectiveness, timeliness, consistency, and quality. The profiles not only provide important information relative to key sites, but also identify issues and the status of the issues at these sites. Using the profiles as a baseline, trends can be identified (e.g., environmental releases, recurrence of accidents, corrective action effectiveness, etc.) that assist in accomplishing the goals outlined in the EH strategic plan.	200	100	100
Total, EH Residents	900	600	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Evaluations			
■ Conduct an ongoing program of environment, safety, and health evaluations of 4-6 major sites per year. Office of Oversight identify, and continue to identify, significant, systemic ES&H vulnerabilities. These evaluations serve as the Department's comprehensive and integrated approach to internal, independent oversight of DOE and contractor line management. They provide a clear, positive benefit to the Department through safety risk and liability reduction, significant cost reduction, and the elimination of unwise expenditures. In short, these comprehensive evaluations have become the focal point of the independent oversight program in the areas of environment, safety and health. The funding level is based on experience in conducting the evaluations, as well as zero-based budgeting determinations. Integrated management evaluations of ES&H programs directly relate to the performance measures relative to ES&H issues, oversight priorities, injury and illness, and the safety and health of workers and the public. Environment, safety, and health is one of the three areas critical to the success of the DOE business lines outlined in the DOE strategic plan. . .	3,100	3,100	3,100
■ Conduct an ongoing program of safeguards and security evaluations consisting of reviews of major sites each year. These oversight functions, that directly relate to DOE's national security interest outlined in its strategic plan, are well developed. They predate the Office of Oversight by over eight years in the form of the Office of Security Evaluations, incorporated as part of the Office of Oversight in late 1994. The funding level has been developed over a long period of time, through numerous budget preparations, and is well established. The funding level is appropriate, and therefore, represents a continuation of this important program, the only one of its kind in the Department. The program has directly contributed to significant reductions in recurrence of safeguards and security issues and is linked to fulfilling the national security responsibilities outlined in the strategic plans, specifically: to effectively support and maintain a safe, secure, and reliable enduring stockpile.	1,900	1,900	1,900

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Special studies and reviews have been an important part of the Office of Security Evaluations and, later, the Office of Oversight. Issues and problems not normally covered by the more traditional oversight functions (i.e., safety management evaluations, safeguards and security inspections, EH Residents surveillances and follow-up activities, and analysis efforts) are often referred to the Office of Oversight. For example, reports have included the Molten Salt Reactor Experiment, Occurrence Reporting Programs within DOE, the Aviation Safety Review, the Brookhaven National Laboratory Tritium Plume Interim Review, the Employee Assistance Program Referral Option Review, and the Emergency Management Review. All are examples of the kinds of reviews and special studies conducted by the Office of Oversight that have contributed to a particular issue in which senior DOE managers were interested. This has been a recurring and appropriate function for the independent oversight program, a program best suited to provide an unbiased evaluation of a particular Departmental issue. The funding level is appropriate especially with increased efficiencies of operations, and is determined over time through experience in dealing with the more non-traditional type of oversight reviews and studies–over 38 reviews and special studies since late 1994. This function is linked to increased customer satisfaction with oversight priorities, timeliness, consistency, and quality. Also, by providing senior managers with an independent view of particular issues, this function directly supports DOE's four business lines listed in its strategic plan: energy resources, national security, environmental quality, and science and technology.	1,100	1,000	1,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The follow-up function is relatively new and has gained a great deal of momentum over the past few years. "Follow-up" is an essential ingredient in the oversight program in determining the effectiveness of actions taken to correct weaknesses identified as the result of evaluations, accident investigations, and special studies and reviews. The funding level has been determined through careful study and zero-based budgeting techniques, and as the result of recent experience in this important area as well as change in procedures for efficiency and streamlining of operations. The performance measures linked to this important function are: (1) downward trends in previously identified issues; (2) decreased rates of occupational injury and illness; (3) downward trends in recurrence of accidents; and (4) a significant reduction in recurrence of ES&H and safeguards and security issues. Also, the function is directly related to an increase of customer satisfaction with oversight priorities, timeliness, consistency, and quality. All follow-up activities directly relate to accomplishment of the ES&H and national security goals discussed in the DOE and EH strategic plans (i.e., national security and environmental quality).	3,300	2,200	2,200
■ The conduct of evaluations requires the efforts of qualified, experienced inspectors and evaluators. In addition to recruiting qualified staff, the Office of Oversight has developed programs to ensure these individuals maintain a high degree of competence. Qualification standards and re-qualification programs have been mainstays within the independent oversight program since its inception. In fact, the original overall program was developed for the Office of Security Evaluations. The funding level is appropriate and is well established. This internal, continuous improvement program directly supports the mission of the Office of Oversight and, therefore, contributes directly to the strategic goals of EH and the Department.	240	150	150

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The certification program is specifically designed for safeguards and security personnel and focuses on "certification." The program is well developed, and its funding level has been determined over a long period of time and through numerous budgeting efforts. The certification of safeguards and security inspectors directly relates to the Office of Oversight mission of conducting safeguards and security evaluations, maintaining safeguards and security profiles on key DOE sites, and providing senior DOE management with an independent view of the status of safeguards and security policies and programs throughout the complex.	100	100	100
■ As a direct result of the experiences and expertise developed within the Office of Oversight, it is able to provide tools and share information (handbooks, videotapes, and lessons learned) with numerous organizations within the Department. This is an important "information sharing" effort carried out by an organization in an ideal position to do so. The funding level has been determined by experience and by the expressed needs of the ES&H and S&S communities. The funding level is important and appropriate. The function has much to do with sharing lessons learned and is tied directly to performance measures relating to trends, consistency, and quality of oversight products. The function enhances the independent oversight program and directly contributes to the ES&H and S&S goals of EH and the Department as expressed in the strategic plans.	400	350	350

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conduct an ongoing program of environmental audits in compliance with the Executive Order, "Greening the Government Through Leadership in Environmental Management." These evaluations serve as the Department's comprehensive and integrated approach to compliance with environmental regulations for Executive Agencies. Requirements of the Executive Order that will be accomplished are: development and implementation of a regulatory compliance audit program; facility level environmental regulatory compliance audits; routine environmental regulatory compliance audits or environmental management systems audits (every three years); reviews and audits of compliance with toxic release inventory reporting and emergency planning and reporting requirements; and updating audit protocols with the requirements of DOE's environmental management systems. Some environmental areas for review are toxic release inventory and emergency planning, environmental monitoring, pollution prevention effectiveness, waste characterization.	0	0	800
■ The comprehensive set of performance objectives and criteria is a primary tool used to ensure consistency and thoroughness in the conduct of ES&H reviews and integrated safety management evaluations. The template was originally developed by the Office of Oversight and has received Department-wide recognition. The performance objectives and criteria provide the detail necessary to carry out the oversight evaluations. The funding level is appropriate and was derived since the creation of the Office of Oversight in late 1994 and as the result of numerous safety management evaluations and individual efforts. The funding level is well developed and directly relates to ES&H issues mentioned in the performance measures. Specifically, a significant reduction in recurrence of ES&H issues, satisfaction with oversight quality, and ensuring the safety of workers and the public. The template, performance objectives, and criteria have proven extremely valuable in fulfilling the mission of the Office of Oversight and, therefore, directly relate to the successful accomplishment of the goals listed in the EH and DOE strategic plans	100	100	100
Total, Evaluations	10,240	8,900	9,700

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Accident Investigation			
■ The DOE Accident Investigation Program was assigned to the Office of Oversight in 1995. Since then, the program has been streamlined. Accidents are now responded to in a highly coordinated, timely, and focused manner. The funding level was determined by experience with the new, streamlined program, by zero-based budget processes, and by comparison to the previous program, which was much more costly. The functions related to the program link directly to the downward trend in the recurrence of accidents performance measure. Also, the program is linked to the strategic plans relative to worker safety and environmental quality	100	100	100
■ Develop functional program materials and present accident investigation techniques and revised methods for implementing the accident investigation program to DOE Headquarters and field personnel. These materials have been developed or updated (i.e., the DOE Order) since the program was transferred to the Office of Oversight. The effort was successful and is appropriate. The information is incorporated into the Office of Oversight's analysis effort to provide a comprehensive program. The funding level was determined through experience and the actual cost of developing the necessary materials and methods used in fulfilling the goals of the program. This program is now well established and will continue to be enhanced in the years to come	200	200	200
Total, Accident Investigation	300	300	300

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Analysis			
■ The Office of Oversight has developed a core analysis capability solely dedicated to the analysis of data collected by oversight activities and available from Departmental databases and other sources. The analysis data feeds into all oversight activities for planning purposes. The funding level was established based on experience and a mature process providing for efficiencies in operations of streamlining activities and by zero-based budget techniques. The effort directly links to all performance measures relating to measuring trends in ES&H and S&S and other areas of interest. Additionally, the analysis group enables the Office of Oversight to better focus its resources and its evaluations efforts.	650	400	400
■ Develop and maintain the independent oversight program infrastructure, including procedures, handbooks, information management systems, and tools.	100	100	100
■ Developed the infrastructure and programmatic guidance for the comprehensive certification program that includes the technical qualification program standards and appraisal analysis of management systems.	150	0	0
■ Develop, disseminate, and update the site profiles based on input from the EH Residents, Office of Oversight evaluations and reviews, and other sources	100	100	100
Total, Analysis	1,000	600	600
Enforcement			
■ Continue to conduct approximately 10 full field investigations resulting in formal enforcement actions involving Notices of Violation related to Price-Anderson Amendment Acts enforcement activities.	975	800	975
Total, Enforcement	975	800	975
Defense Nuclear Facilities Safety Board Liaison			
■ Coordinate the Board recommendation process.	200	150	200
■ Manage the Department's interface activities.	150	150	150
■ Coordinate responses to Board reports and inquiries.	100	100	100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Maintain the Department's central repository of official Board communications.	150	100	150
Total, Defense Nuclear Facilities Safety Board Liaison	600	500	600
Total, Oversight	14,015	11,700	12,775

Explanation of Funding Changes from FY1999 to FY2000

	FY 2000 vs. FY 1999 ($000)
Evaluations	
■ Conduct an on going program of environmental audits in compliance with the Executive Order, "Greening the Government Through Leadership in Environmental Management."	+800
Enforcement	
■ Conduct increased site reviews and emphasis on a more robust nuclear safety enforcement program	+175
Defense Board Liaison	
■ Responding to Board actions based on increased activities	+100
Total Funding Change, Oversight	+1,075

Health Studies

Mission Supporting Goals and Objectives

The Health Studies program promotes the health and safety of DOE's workers and communities surrounding Department sites, and supports studies to understand the effects of radiation and other hazards associated with the DOE operations on humans. It is comprised of four programs: Occupational Medicine, Public Health Activities, Epidemiologic Studies, and International Health Programs. Additional funding for Public Health Activities is included in the Defense Environmental Restoration and Waste Management Appropriation.

Occupational Medicine provides the Department's occupational medicine clinics with policies, guidance and tools necessary for them to identify and track occupationally related health effects among worker populations, effectively communicate to workers the reasons for and results of medical testing and surveillance conducted, and identify opportunities to prevent or mitigate work-related injuries and illnesses.

Public Health Activities support health studies, health education and promotion, and other public and occupational health related initiatives at DOE sites pursuant to a consolidated and coherent strategy which includes a public health agenda for each site. Community and worker health studies are conducted in partnership with the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) under a Memorandum of Understanding (MOU) with the Department of Health and Human Services (HHS). This program supports studies to assess the health of populations living near or working at DOE sites in order to determine if the health of workers and nearby communities has been impacted by DOE operations. Information from the health studies is communicated to the DOE workforce, line management and community stakeholders. Additional funding for this initiative is found in the Defense Environmental Restoration and Waste Management portion of this budget.

Epidemiologic Studies collect worker injury and illness surveillance data on the current workforce needed to identify emerging worker health issues associated with job exposures and to evaluate the impact of health and safety practices at DOE facilities. This program includes communication of occupational and environmental health information to DOE workers, DOE communities, and the general public. The program facilitates interventions that reduce or eliminate worker risks and provides a means to evaluate these corrective actions once implemented.

International Health Programs provide health and environmental programs in the Marshall Islands for those populations and land areas exposed to radioactive fallout from the U.S. atmospheric nuclear testing program in the Pacific. In addition, research programs are supported to expand the knowledge of radiation health effects among workers and populations exposed to ionizing radiation as a result of accidents or environmental contamination in the former Soviet Union and Spain.

Significant Accomplishments

Occupational Medicine

Medical Surveillance of Current and Former Workers

- Provide medical monitoring for current and former DOE employees at risk for occupational disease, particularly chronic beryllium disease. Plan and implement expanded medical surveillance and disease prevention and exposure control programs across DOE sites for workers who have been exposed to beryllium. Continue to support the research and innovation in exposure assessment and medical surveillance. Continue support for DOE former workers program, in response to Section 3162 of the Defense Authorization Act of 1993, by conducting the second phase of the ongoing pilot program at ten DOE sites for evaluating the health of former workers who may be at significant risk due to past occupational exposures. (FY98: $9,650; FY99: $10,681; FY00: $10,681)

  - Complete an additional four needs assessments for establishing the basis of a more detailed program of medical follow-up and, at six sites, begin to implement a medical surveillance program for former workers.

- Continue testing and demonstration of the Medical Surveillance Information System (MSIS). (FY98: $900; FY99: $850; FY00: $850)

  As part of this program, the following commitment made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy has been accomplished:

  - Through a pilot linkup with the Y-12 site, demonstrate capability of the relational software developed as part of the Medical Surveillance Information System (MSIS) to allow DOE occupational medicine staff (and other Headquarters and site health professionals) to look at worker cohorts and analyze site-wide and complex-wide worker health trends.

- Continue technical assistance visits to site occupational medicine clinics to support Operations Office efforts in providing direction in the efficient delivery of quality occupational medical services. Serve as a focal point for communication within the Department on occupational health by preparing and disseminating health risk and protection data and facilitating the sharing of information between and among research and operating organizations. Update and revise the occupational medicine section of DOE Order 440.1, "Worker Protection Management for DOE Federal and Contractor Employees." Complete medical standards rulemaking for the Personnel Assurance Program; the Protective Force Medical Standards (10 CFR 1046), and the Personnel Security Assurance Program (10 CFR 710). Continue to survey DOE sites on the degree of workplace violence, prepare a Departmental workplace violence policy for Secretarial issuance, and establish a repository for workplace violence information and analysis. Provide occupational medicine expert consultation and specific studies to address concerns associated with the operation of DOE site occupational medicine programs. Issue guidance for the medical aspects of the site Contractor Employee Assistance Program. (FY98: $485; FY99: $400; FY00: $400)

- Continue to assist DOE with the Radiation Emergency Accident Center/Training Site (REAC/TS) support. (FY98: $300; FY99: $300; FY00: $300)

Public Health Activities

- Continue collaboration in epidemiologic studies conducted under the Memorandum of Understanding (MOU) with the Department of Health and Human Services (HHS), including environmental dose reconstruction projects at major DOE sites, single and multi-site cancer mortality studies of DOE workers, and community outreach and educational efforts. As part of this collaboration, develop a credible, coherent DOE/HHS public and occupational health agenda of activities at DOE sites. Conduct workshops and meetings with stakeholders as part of the agenda-setting process. Two million dollars was included in FY 1998 for the Hanford Thyroid Disease Study, which was completed at the end of that fiscal year. (FY98: $16,000; FY99: $13,900; FY00: $13,825)

  As part of this program, the following commitment made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy has been accomplished:

  - Develop a coordinated health agenda with the Department of Health and Human Services that is responsive to stakeholder and customer needs.

Epidemologic Studies

- In FY 1998, studies conducted under the State Health Agreement Program were completed and the program was ended. (FY98: $4,000; FY99: $0; FY00: $0)
- Continue epidemiologic surveillance of DOE workers; add the Oak Ridge Reservation to the epidemiologic surveillance program; add selected dosimetry information to epidemiologic surveillance data collection; analyze data collected by DOE for other purposes to determine their potential value for, and use in, epidemiologic analyses; make reports and health information available through the Comprehensive Epidemiologic Data Resource and through other Internet access; publish findings in annual epidemiologic surveillance reports; provide briefings and written materials to stakeholders on completed studies; identify emerging health issues requiring evaluation and conduct follow-up investigations; and continue communication activities with affected workforces and communities. (FY98: $2,050; FY99: $2,300; FY00: $2,300)

  Under this program, the following commitments made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy have been accomplished:

  - Expand the current ten-site illness and injury surveillance program for current workers to include the major three facilities at the Oak Ridge Reservation.
  - Complete the review of site epidemiological records that are prohibited from destruction because of their potential use in health studies and identify those series of records that no longer need to be maintained.
  - Establish and maintain a database of FY 1998 access issues and problems relating to health research at DOE sites in order to provide detailed and accurate information for analyzing what kinds of access problems remain and how to solve them.
- Continue national and international efforts to analyze biokinetic parameters for deposition and retention of transuranics in humans to improve dosimetry models and occupational radiation

standards. Publish approximately ten peer-reviewed articles documenting research findings, including one that characterizes a new dosimetry model for americium-241. (FY98: $1,000; FY99: $1,000; FY00: $1,000)

International Health Programs

Marshall Islands

- Provide special medical care and necessary environmental monitoring in the Marshall Islands. Provide medical surveillance and care for the Rongelap and Utirik populations exposed to fallout from the Castle Bravo atmospheric nuclear test in 1954 and provides environmental monitoring and dose assessment for the Bikini, Enewetak, Rongelap and Utirik atolls, which were most heavily contaminated by fallout from the U.S. nuclear weapons testing in the Pacific. These activities are mandated by Public Law 99-239, the Compact of Free Association Act of 1986. (FY98: $6,800; FY99: $6,800; FY00: $6,800)

  Under this program, the following commitments made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy have been accomplished:

  - Award and implement a New Cooperative Agreement for Medical Care Delivery in the Marshall Islands.
  - Make available 10,000 documents related to Nuclear Weapons Testing in the Marshall Islands on the Internet.

European Programs

- Continue, in collaboration with the National Cancer Institute, long-term leukemia, thyroid disease and ocular cataract studies of the Chernobyl accident. (FY98: $1,500; FY99: $1,500; FY00: $1,500)
- Continue U.S.-Russian collaborative research efforts involving the conduct of full-scale cohort studies in the South Ural region to investigate the health effects on workers and local populations associated with radiation exposures from the operations of the Mayak weapons facility in Russia. Begin support of molecular epidemiology, biomarker, and biological tissue bank projects. (FY98: $3,000; FY99: $3,000; FY00: $3,000)

  Under this program, the following commitments made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy have been accomplished:

  - Complete microfilming of the epidemiological and radiation health records associated with the Mayak Production Association in Russia.
- Continue U.S. collaboration with Spain in the Project Indalo program of environmental surveillance and medical monitoring for the effects of plutonium contamination. (FY98: $300; FY99: $300; FY00: $300)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Occupational Medicine	11,335	12,231	12,231	0	0.0%
Public Health Activities	16,000	13,900[a]	13,825[b]	-75	-0.5%
Epidemiologic Studies	7,050	3,300	3,300	0	0.0%
International Health Programs					
Marshall Islands	6,800	6,800	6,800	0	0.0%
European Programs	4,800	4,800	4,800	0	0.0%
Total, International Health Programs	11,600	11,600	11,600	0	0.0%
Total, Health Studies	45,985	41,031	40,956	-75	-0.2%

[a]In addition, $12 million for Public Health Activities was funded in the Defense Environmental Restoration and Waste Management Appropriation in FY 1999.

[b]In addition, $20 million for Public Health Activities was funded in the Defense Environmental Restoration and Waste Management Appropriation in FY 2000.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Occupational Medicine

Medical Surveillance of Current and Former Workers

- In light of the number of cases of chronic beryllium disease in the DOE workforce, expand the current program of medical screening of former workers exposed to beryllium to complete screening of all former workers at 16 sites where beryllium was used but testing has not been conducted to date. Pilot programs conducted at Rocky Flats and Y-12 facilities provide the basis for estimating the costs of identifying, locating and screening beryllium-exposed former workers for the additional sites to be added to this program. Continue program to support research and innovation in the early detection of sensitization to beryllium in DOE workers.

  Continue support for policy development and execution of a beryllium disease prevention and exposure control program for current and future workers exposed to beryllium with the objective of: defining operational safety parameters; establishing improved medical surveillance programs; and facilitating information exchange for the prevention of chronic beryllium disease.

  Continue support for the DOE former workers program, in response to Section 3162 of the Defense Authorization Act of 1993, by conducting the second phase of the ongoing pilot program of 10 projects at 9 DOE sites for evaluating the health of former workers which may be at significant risk due to past occupational exposures. This pilot program will cover approximately one quarter of all the DOE sites and approximately 5 percent of the workforce. The budget requested for FY 2000 allows all ten ongoing projects to continue in the medical monitoring phase (Phase II).

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The full scale deployment of the pilot program is justified on the basis that all the initial Phase I reports identified groups of former DOE workers at each site with significant exposures to selected hazards. Experience from the conduct of the initial 6 Phase II pilot projects have provided the basis for establishing the budgets necessary for full scale program deployment. This portion of the program will be completed by the end of FY 2002. More detailed descriptions of individual medical surveillance projects can be found at the end of this document.			
Under this program, the following commitments made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy will be accomplished:			
▸ Continue to survey current and former workers for sensitivity to exposure to beryllium and the presence of chronic beryllium disease.			
▸ Survey selected former workers and workplace hazards pursuant to Public Law 102-484, Section 3162, to examine possible links between hazardous substances and exposures during work and their adverse health effects.	9,650	10,681	10,681
■ Conduct pilot demonstrations of the Medical Surveillance Information System (MSIS) at Oak Ridge (Y-12 and K-25), Savannah River, Allied Signal-Kansas City, Sandia, Rocky Flats, and Morgantown Energy Technology Center sites. Automated linkage of employee medical, exposure and job information into a single record is a critical component in the ability of DOE health professionals to identify and, where appropriate, intervene in emergent site-wide and complex-wide worker health problems. Such relational data bases do not currently exist within the DOE complex, and the MSIS must be tested and demonstrated at a variety of sites using actual site data to verify its validity and ensure its adoption and use. After successful demonstration of the system during the pilot phase, a cost-sharing arrangement with sites will be developed to implement complex-wide linkage of the MSIS by FY 2003. After the system becomes fully operational, annual costs will be limited to those necessary for system maintenance and upgrades.	900	850	850

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue level of effort support of Operations Offices in their efforts to provide efficient delivery of quality occupational medicine services to workers. Develop implementation guidance for the revised occupational medicine section of DOE Order 440.1, "Worker Protection Management for DOE Federal and Contractor Employees." Continue to play a central role in facilitating communication and coordination among the occupational medicine clinics and occupational health researchers in the complex by sponsoring meetings, establishing web sites, and facilitating formal and informal communications which help disseminate information from health studies and surveillance projects.	485	400	400
■ Continue level of effort support of the Radiation Emergency Accident Center/Training Site (REAC/TS) program which provides rapid response medical expertise and training to address radiological accidents. Such a capability is of continuing importance, particularly in light of the opening of the Waste Isolation Pilot Plant and the potential for accidents associated with the transport of transuranic waste to New Mexico	300	300	300
Total, Occupational Medicine	11,335	12,231	12,231

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Public Health Activities			
■ Continue occupational and community health studies at and around DOE sites under the Department of Health and Human Services (HHS) Memorandum of Understanding (MOU). As long-time DOE workers and residents near DOE facilities age, there will likely be an increased ability to detect late health effects of exposures associated with DOE operations. The results of a number of studies conducted to date have suggested the need for further research designed to help understand the long-term health impacts of exposure to low levels of radiation. The program of occupational and community studies conducted by HHS under its MOU with DOE offers an expanded basis upon which radiation protection standards and practices can be refined and improved. By engaging in a joint agenda setting process, DOE and HHS have worked together to develop a coherent, credible set of research priorities across the DOE complex. This agenda will be an invaluable tool in determining which studies are critical to pursue in both the near and long term. DOE's FY 2000 request enables the Department to provide only about two-thirds of the level of funding for projects which HHS has recommended to DOE for FY 2000	16,000	13,900	13,825
Total, Public Health Activities	16,000	13,900	13,825

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Epidemologic Studies			
■ The State Health Agreement program was concluded at the end of FY 1998, and no further funding is requested..	4,000	0	0
■ Continue the ongoing program of epidemiologic surveillance to enhance DOE's ability to protect worker health by monitoring the health of active workers and identifying potential health risks and occupational illnesses. Ongoing health monitoring of workers in this multi-site program provides a mechanism to improve the understanding of health effects associated with work at DOE sites. The program facilitates communication of this improved understanding to workers. Epidemiologic surveillance also facilitates evaluation of the effectiveness of risk reduction efforts through its ongoing monitoring of health trends. The program supports the Department's only multi-site health information database linked to current workers and has contributed to the development of automated medical data management systems at several DOE sites. Key features of the program include a review of the health of women in the DOE workforce, development of automated health data management and industrial hygiene exposure data systems at several participating sites, and continue operation of the Comprehensive Epidemiologic Data Resource and other internet sites to ensure dissemination of health information to DOE workers, DOE communities, and the general public. The budget request will support an expanded surveillance system which includes incorporation of all three facilities at Oak Ridge into the overall program and will provide an enhanced capability to assess worker health in relation to occupational radiation exposures by increasing the collection of dosimetry data and their integration into the system.	2,050	2,300	2,300

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue support of the U.S. Transuranium and Uranium Registries (USTUR), a major component of DOE's long-standing programs to develop and refine radiological protection standards that are in world-wide use to help ensure a safe workplace. The Registries have become a unique resource of data, capabilities and materials for studying the deposition, biokinetics and dosimetry of long lived, alpha-emitting materials, including uranium and plutonium, in humans. Based on voluntary enrollment of occupationally exposed individuals, the Registries perform postmortem radiochemical and histopathologic analyses of donated tissues to obtain data fundamental to determining internal doses and bioeffects due to intake of these radioactive materials. Continued evaluation and refinement of biokinetic models is essential to demonstrate that occupational doses are being appropriately calculated. Another important capability of the USTUR is its provision of assistance and consultations to other U.S. and foreign researchers, governmental agencies and the public on the modeling and measurement of internal depositions. This is facilitated by the Registries' function as a repository of donated tissues, histopathology slides, similar tissues and materials from animal studies, and associated databases to ensure their availability for use by all interested researchers. The provision of these services in an academic setting maximizes both openness and cost-effectiveness. The budget request is based on experience in running the program to date, the waiting list of donors, and the continued demand for and use of the Registries analytical capabilities.	1,000	1,000	1,000
Total, Epidemiologic Studies	7,050	3,300	3,300

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
International Health Programs			
Marshall Islands			
■ Continue the provision of mandated special medical care and ensure full follow-up on diseases potentially associated with radiation exposure resulting from the nuclear tests in the Marshall Islands. Utilize a new medical contractor to deliver year around community-based medical services that encourage community involvement and provide more extensive medical care for the Rongelap and Utirik exposed populations. Continue characterization of the residual levels of radionuclides in the environment, development of mitigation strategies to reduce uptake of these radionuclides in local food products, and monitor individual dose assessments needed by the local atoll communities to make informed decisions on plans to resettle the Bikini and Rongelap Islands.	6,800	6,800	6,800
European Programs			
■ Continue support of Chernobyl-related health effects studies. Combined, the long-term leukemia, thyroid disease and ocular cataract studies of populations and workers affected by the Chernobyl accident represent the largest prospective research of the health effects of environmental exposure to radiation outside of the study of Japanese A-bomb survivors. They involve the medical monitoring of a large number of people known to be exposed to high levels of radiation and offer a basis for the development of better tools for assessing populations at risk and improved radiation standards for workers and the general populations. In particular, the thyroid disease studies in Ukraine and Belarus will provide valuable information relevant to populations living downwind from Hanford, the Nevada Test Site, and other DOE sites, as well as populations throughout the U.S. who were exposed to radioiodine (I-131) as a result of atmospheric testing of nuclear weapons. The Joint Coordinating Committee for Civilian Nuclear Reactor Safety (JCCCNRS) recently signed 30-year protocols calling for U.S. participation (DOE and NCI) for these three long-term studies through FY 2026..	1,500	1,500	1,500

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue the Joint Coordinating Committee for Radiation Effects Research (JCCRER) program in collaboration with Russia and other U.S. agencies. This program continues to have the potential for a very strong return on investment by providing, within the next several years, a continuing source of new information on the effects of chronic exposure to low dose rate radiation. This information will ultimately be important for setting worker and public radiation protection standards. The focus of ongoing JCCRER efforts is epidemiologic and dose reconstruction studies based on worker and population radiation health data. Six major environmental and occupational health studies are underway. In addition, valuable records are currently being preserved on microfilm. It is anticipated that ongoing DOE-supported epidemiologic and dose reconstruction studies will continue through April 2000. The microfilming effort, which is included in the Secretary's performance agreement with the President, is expected to continue through FY 2000 and to result in the filming of an estimated 3 million pages of critical records. Additionally, DOE issued a request for applications in June 1997 for new U.S.-Russian collaborative population-bases studies (to build on ongoing work) related to molecular epidemiology, biomarkers, biological tissue banks, and epidemiology. All current projects are scheduled to be completed by FY 2003. In contrast to DOE's support of studies of Japanese atomic bomb survivors, which has been ongoing for over 50 years, analysis of available Russian data has just begun. The outcomes of this research will determine whether and what kind of future work will be conducted.			
Under this program, the following commitment made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy will be accomplished:			
▸ Continue Support of Health Impact Analyses of Russian Workers and Communities Exposed to Relatively High Radiation Levels As a Basis for Validating Current U.S. and DOE Radiation Protection Standards	3,000	3,000	3,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue the Project Indalo program which consists of environmental surveillance and medical monitoring conducted since 1966. Over 800 residents have been tested throughout the 31-year program. Since 1984, approximately 150 different people are tested annually; about 50 may have been internally contaminated. In the summer of 1998, the U.S. and Spain chartered a four-person panel of outside, independent experts who reviewed and summarized the scientific and technological aspects of the program in Palomares and made recommendations on future directions for the program. Based on these recommendations, the program's work has been revised to address a more focused set of environmental and medical concerns..	300	300	300
Total, European Programs	4,800	4,800	4,800
Total, International Health Studies	11,600	11,600	11,600
Total, Health Studies	45,985	41,031	40,956

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Public Health Activities	
■ Funding is decreased by $75K. This is not a significant change	-75
Total Funding Change, Health Studies	-75

Radiation Effects Research Foundation (RERF)

Mission Supporting Goals and Objectives

The United States has supported studies for the past 50 years on the health effects of radiation on the survivors of the Hiroshima and Nagasaki atomic bombings. The Atomic Bomb Casualty Commission (ABCC) began studies in 1947, funded by the Atomic Energy Commission, with the National Academy of Sciences as the support services grantee responsible for setting up and running the laboratories in accordance with a U.S. presidential directive. In April 1975, the Radiation Effects Research Foundation (RERF) was established as the full successor to the ABCC and was designated to continue the research according to an agreement between the governments of the United States and Japan.

The DOE is committed to the support of the atomic bomb survivor studies as long as valuable health effects information is to be gained by further follow-up of the survivors. Approximately 64,000 survivors are currently being followed in the RERF studies.

Significant Accomplishments

- Continue RERF program research. Data obtained at the RERF is used for radiation risk assessment by various national and international agencies, and is used to update and verify radiation protection standards throughout the world. No epidemiologic study of late radiation effects has been as informative or influential as that of the A-bomb survivors, and the world scientific community has a stake in maintaining the strength of the RERF program. In 1996, an International Blue Ribbon Panel's report was released that made recommendations on current and future research at the RERF. The Panel's report identified specific aspects of the RERF program as having direct benefits to Japanese A-bomb survivors, and subsequently the Japanese government assumed responsibility for funding these parts of the program. (FY98: $14,000; FY99: $14,000; FY00: $13,500)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
RERF	14,000	14,000	13,500	-500	-3.6%
Total, RERF	14,000	14,000	13,500	-500	-3.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Radiation Effects Research Foundation (RERF)			
■ Continue RERF research program and implement Blue Ribbon Panel recommendations which include improvement of the peer review system and increased international cooperation and training opportunities at the RERF. Cooperatively, with the National Academy of Sciences, implement a long-term funding and management strategy for the RERF. In FY 2000, the Department will be in the fourth year of a five-year funding arrangement with Japan's Ministry of Health and Welfare..	14,000	14,000	13,500
Total, Radiation Effects Research Foundation	14,000	14,000	13,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
RERF	
■ $500K reduction due to increased efficiencies at RERF and implementation of Blue Ribbon Panel recommendations	-500
Total Funding Change, Radiation Effects Research Foundation	-500

Environment, Safety and Health - Other Defense Activities

Program Direction

Mission Supporting Goals and Objectives

Program Direction in this account provides overall direction and support for the Office of Environment, Safety and Health (EH) defense programs to ensure that all operations are conducted in the most efficient, effective manner.

Program Direction in this account has been grouped into the following categories:

Salaries and Benefits provide funding for a Federal staff (FY98: 200 FTE; FY99: 226 FTE; FY00: 221 FTE) who have the technical expertise required to carry out the essential EH mission. The EH mission requires experts to: develop overall environment, safety and health policy for DOE sites and facility operations; provide a central and coordinated source of technical expertise to all field elements; provide a central clearing house for information, analysis and feedback regarding new efforts, present activities, and unforeseen occurrences taking place at the multitude of diverse facilities within the DOE complex; provide the Department with independent oversight capability, as well as health studies endeavors; and perform activities relative to environment, safety and health programs across the DOE complex.

Travel includes all costs of transportation, subsistence, and incidental travel expenses of EH's Federal employees in accordance with Federal Travel Regulations. This also includes travel costs associated with a permanent change of duty station.

Support Services are not provided for in this decision unit, consistent with Congressional direction.

Other Related Expenses includes training for Federal staff.

Significant Accomplishments

Salaries and Benefits

- Salaries and Benefits funding requirements support EH staff working on Defense activities. Overall, salaries and benefits are in line with the full-time-equivalents (FTE) requested and include the 4.1% Economic Assumption provided by the Office of Management and Budget (OMB). (FY98: $19,500; FY99: $23,485; FY00: $23,285)

Travel

- Travel requirements are consistent with support for the EH Federal staff and include the 2.1% Economic Assumption as provided by the OMB. (FY98: $500; FY99: $1,284; FY00: $1,284)

Other Related Expenses

- Includes tuition costs for EH Federal employees. (FY98: $0; FY99: $0; FY00: $200)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salaries and Benefits	19,500	23,485	23,285	-200	-0.9%
Travel	500	1,284	1,284	0	0.0%
Other Related Expenses	0	0	200	+200	>999%
Total, Program Direction	20,000	24,769	24,769	0	0.0%
Full-Time-Equivalents	200	226	221	-5	-2.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
■ Salaries and Benefits reflect the FTE split between Energy Supply and Other Defense Activities. Overall, salaries and benefits include the Economic Assumption provided by the OMB.	19,500	23,485	23,285
Travel			
■ Overall, EH travel requirements are in line with the overall EH Federal staff.	500	1,284	1,284
Other Related Expenses			
■ Includes tuition costs for the EH Federal employees previously budgeted in Management and Administration.	0	0	200
Total, Program Direction	20,000	24,769	24,769

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Requirements are commensurate with the allocation of Federal Staff between Other Defense Activities and Energy Supply Appropriations.	-200
Training	
■ Previously budgeted in Management and Administration	+200
Total Funding Change, Program Direction	0

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	0	0	200	+200	>999%
Total, Other Related Expenses	0	0	200	+200	>999%

Hearings and Appeals

Office of Hearings and Appeals Program Direction

Mission Supporting Goals & Objectives

The Office of Hearings and Appeals (OHA) conducts all of the Department of Energy's adjudicative process and provides various administrative remedies. OHA holds evidentiary hearings in cases involving the eligibility of employees to hold security clearances and "whistleblower" complaints involving any of the Department's 120,000 contractor employees. OHA also considers appeals of adverse determinations concerning requests for information under the Freedom of Information and Privacy Acts, and issues determinations involving requests for exception based upon claims of hardship or inequity resulting from the application of any DOE order, rule, regulation or other requirement. Other responsibilities include considering appeals of determinations by the Office of Civilian Radioactive Waste Management of payments-equal-to-taxes for eligible jurisdictions, and of determinations by the Office of Environmental Management concerning contributions to, and reimbursements from, the Uranium Enrichment Decontamination and Decommissioning Fund. OHA continues to be assigned further responsibilities.

OHA's goal is to promote successful and uninterrupted DOE operations through the deliberate, expeditious and equitable resolution of all claims of adverse impact emanating from the operations of the Department. In pursuing this objective, OHA issues timely, high quality, articulate decisions that consider and balance the Congressionally mandated objectives underlying each proceeding, the rights and interests of individual litigants, and the interests of customers, stakeholders and other concerned parties such as the public, state and federal governments. In cases involving access to classified information and other secure materials, for example, the employment interests of individuals are weighed against the national interest in restricting access only to trustworthy employees. Where "whistleblower" complaints are concerned, the interests of the Department lie in promoting an atmosphere in which employees may raise concerns about fraud, waste, abuse, safety and health without fear of retaliation while ensuring that DOE's contractors may manage their operations in the manner they believe is most efficient. All funding for OHA is for Program Direction, which provides the federal staffing resources and associated costs required to carry out its mission.

Performance Measures

Some specific measures of performance are:

- The quality of OHA decisions as measured by the record of being upheld upon appeal and review of feedback received from the courts and OHA customers and stakeholders.
- The number of decisions issued. The number of cases decided does not alone reflect the accomplishments of OHA. While some cases are relatively straightforward and can be resolved in a few days, others consume hundreds of hours of high-level professional time. For example, many

whistleblower cases consume several months, involving multiple pre-hearing conferences, lengthy evidentiary hearings with many witnesses, the review of hundreds of pages of documents, and the drafting of a detailed and lengthy decision.

- Meeting time deadlines. OHA continuously monitors the status of each case pending before the office to determine whether resolution of the matter is proceeding on schedule and whether deadlines are being met.
- Responsiveness to customer needs, as measured by feedback received.

Significant Accomplishments and Program Shifts

- As a result of the Secretary's Openness Initiative, all contractor employee whistleblower cases previously under the jurisdiction of other headquarters offices — principally the Office of the Inspector General — will become the responsibility of OHA. This includes a backlog of over 50 open case investigations and the hearings that will follow the completion of these investigations. Whistleblower proceedings are (with the exception of a few isolated matters) the most labor intensive of OHA's activities. The amendments to the regulations will shift nearly all responsibilities under the whistleblower program from the Office of the Inspector General (IG) to OHA. As a result, OHA will take on the added responsibility for conducting investigations of whistleblower complaints and will issue all initial agency decisions. OHA estimates that these new responsibilities will increase its workload by 35 percent.
- Once the transfer of the whistleblower function to OHA is completed, the Office of Inspector General will transfer to OHA some of the funding necessary to perform that work. In addition, to maintain its *current* level of activities, OHA will receive funding from other program offices for which OHA provides adjudicative services.
- OHA was delegated the responsibility of conducting investigations of three EEO complaints involving the Office of Civil Rights (which normally investigates EEO complaints but could not do so in these cases because of the possible conflict of interest). OHA successfully completed each investigation and issued a detailed report within the applicable regulatory deadline.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	1,725	1,805	2,375	+570	+31.6%
Travel	35	60	80	+20	+33.3%
Support Services	30	30	20	-10	-33.3%
Other Related Expenses	510	505	525	+20	+4.0%
Total	2,300	2,400	3,000	+600	+25.0%
Full Time Equivalents	21	21	25	+4	+19.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Compensation for civilian employees, including performance awards. With this funding:			
■ OHA resolved 203 cases in FY 1998, and expects to resolve about 240 cases in FY 1999 and 250 cases in FY 2000. OHA issues high-quality decisions and has had, and projects that it will continue to have, a singularly successful record of having virtually all of its decisions upheld on judicial review.			
■ In cases in which there is a statutory or regulatory deadline, OHA will meet that deadline virtually without exception. Freedom of Information Act appeals are, for example, resolved within the 20-day statutory deadline.			
■ As required by the Congress in amendments to the Freedom of Information Act, OHA will make its decisions available on its Internet web site (generally on the day they are issued) where they are easily available to all interested persons.			
■ OHA will utilize alternative dispute resolution methods where they can be more efficient or of benefit to the parties. For example, OHA mediated a recent dispute between the Energy Information Administration (EIA) and an electric utility concerning whether EIA could continue to make public certain information provided by the utility. OHA considered the public interest in release of the data against the utility's need to respond to an increasingly competitive market for electricity. Instead of ruling strictly on the legal merits of the matter — and possibly generating a large number of similar cases — OHA facilitated an agreement between the utility and EIA on the releasibility of the information pending public hearings and further review of the issue by EIA. As a result, EIA is now modifying its approach and is coordinating its policy regarding confidentiality with that of other government agencies such as the Federal Energy Regulatory Commission	1,725	1,805	2,375
Travel			
For transportation to DOE field sites to conduct hearings and whistleblower investigations	35	60	80

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Support Services Funding for computer support of the office information system and for assistance in maintaining OHA's Home Page on the Internet for the benefit of the public	30	30	20
Other Related Expenses These include funding for employee training, charges by the Working Capital Fund for base services: rent, utilities, telephone, supplies, postage, building operations, photocopies, telecommunications, printing (including publication of federal register notices, and printing of decisions), and Automated Office Support System support and maintenance. OHA also pays certain services directly, including timesharing (Westlaw) and purchase of computer equipment and software	510	505	525
Total, Program Direction	2,300	2,400	3,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits is due to general pay increases, promotions and within grade increases and an increase of four FTEs associated with a portion of the increased responsibilities OHA will receive pursuant to pending amendments to the DOE's Contractor Employee Protection (Whistleblower) Program. The amendments to the regulations will shift all responsibilities under the whistleblower program from the Office of the Inspector General (IG) to OHA. OHA will take on the added responsibility for conducting investigations of whistleblower complaints and will issue all initial agency decisions	+570
Travel	
■ Increase reflects increased travel to DOE field sites to conduct investigations and hearings consistent with OHA's new responsibilities for DOE's Contractor Employee Protection (Whistleblower) Program	+20

	FY 2000 vs. FY 1999 ($000)
Support Services	
■ Decrease in support services is due to reduced use of contractor	-10
Other Related Expenses	
■ Increase in other related expenses is due to increased Whistleblower work and an increase for the Working Capital Fund due to primarily to projected increases in rent	20
Total Funding Change, Office of Hearings and Appeals Program Direction	+600

Support Services

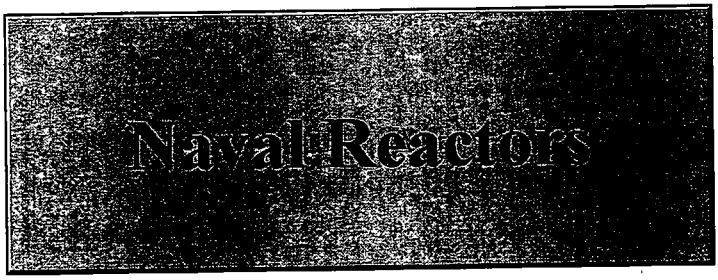
(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Management Support Services					
ADP Support	30	30	20	-10	-33.3%
Total Support Services	30	30	20	-10	-33.3%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	480	480	490	+10	+2.1%
Training	1	5	7	+2	+40.0%
Other	29	20	28	+8	+40.0%
Total, Other Related Expenses	510	505	525	+20	+4.0%


Naval Reactors

Naval Reactors

Program Mission

Naval Reactors has complete responsibility for Naval nuclear propulsion work, beginning with technology development and continuing through reactor operation and, ultimately, ensuring appropriate and responsible reactor plant disposal. The Program's efforts have ensured, and continue to ensure, the safe operation of the many reactor plants in operating nuclear powered submarines and surface ships -- comprising over 40% of the Navy's major combatants, the successful deployment of the advanced fleet reactor for the SEAWOLF class, and the on schedule development of the reactor plant for the VIRGINIA class. Most recently, Naval Reactors is beginning design work on a reactor plant for a new class of aircraft carriers being planned by the Navy.

Naval Reactors is principally a technology program in the business of power generation for military application. The Program's far-sighted development work ensures nuclear propulsion technology provides options to maintain and upgrade current capabilities, as well as meet future threats. Work is integrated as advances in various functional disciplines coalesce into the technology applicable to a Naval nuclear plant. The presence of radiation dictates a careful, measured approach to developing nuclear technology, evolving needed components and systems, and implementing them into existing or future plant designs. Intricate engineering challenges and long lead time to fabricate the massive, complex components require many years before introduction into the fleet.

Program Goal

Facilitate U.S. national security through the application of nuclear energy for propulsion of warships.

Program Objective

Meet requirements for nuclear propulsion by providing the Navy with long-lived, militarily effective reactor plants and ensuring their continued safe and viable operation.

Performance Measures

The following high-level performance measures represent the principal outcomes of Naval Reactors' work. Due to the integrated nature of research and development for nuclear propulsion work, effort overlaps between the measures. For example, the first two performance measures on meeting Navy goals for extended warship operation and ensuring the safety and reliability of reactor plants in Navy warships are closely related. Efforts within each performance measure can impact safety as well as endurance. In a similar manner, work on the new concept steam generator is aimed at improving safety and performance, but also benefits the endurance and acoustic goals. Despite the cross benefits, separate measures are appropriate since they reflect major, important goals of Naval Reactors' work. In the cases where effort overlaps multiple performance measures, the work is identified under the performance measure which represents the work's principal benefit.

The performance measures are integrated into the detailed program justifications within the budget. Thus, within each of the Detailed Program Justifications, Naval Reactors identifies the relevant performance measures from the list below, the principal activity areas necessary to ensure the performance measure outcome (summarized below), and verifiable supporting activities for each area. Decades will pass before overall success can be assessed, due to the inherent intervals between the time a technology is conceived, developed, applied in the fleet and proven over the operating life of the ship.

- **Conduct planned development, testing, examination and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods to ensure Naval nuclear reactors are able to meet Navy goals for extended warship operation.**

  As the Navy downsizes the fleet, demands on remaining ships increase. Each ship must carry more of the burden, be available for missions more of the time, and stay in service longer. To support these operational demands, materials, components and systems must be operationally reliable for longer periods than ever before. For example, plants originally designed for a twenty-year service life are now being called upon to serve up to about fifty years. Exhaustive testing, performance enhancements and development efforts are needed to ensure that component and system endurance -- despite potential corrosion, cracking, mechanical strain, and irradiation -- can be assured throughout extended lifetime.

  Development efforts to date have yielded significant advantages. Enhanced component reliability and improved predictive techniques have allowed the Navy to extend the intervals between major maintenance periods, increasing ship on-line time and, thus, the Navy's war fighting capability, while reducing cost. However, these advancements also generate new development and analysis challenges. For example, the longer intervals between maintenance periods reduce opportunities to examine and/or replace aging components and systems. Thus, more extensive analytical and testing efforts are required to verify materials and component performance. In a similar vein, development of a life-of-the-ship core offers major advantages in terms of ship availability, as well as reducing cost, radiation exposure and waste generation; but a life-of-the-ship core also reduces mid-life opportunities to examine components and help ensure integrity. Testing and verification, therefore, is of paramount importance.

  These efforts are especially challenging given the demanding nature of nuclear propulsion

technology. Components and materials must perform reliably within the harsh environment of a reactor plant. Comprehensive and rigorous analyses are needed to ensure the ability to withstand the deleterious effects of irradiation, corrosion, high temperature and pressure over a lifetime measured in decades. In addition, Naval reactor plants must be rugged enough to accommodate ships' pitching and rolling; have the resilience to respond to rapidly-changing demands for power; be robust enough to withstand the rigors of battle; and be safe and easily maintainable for the sailors who live next to them.

The following activity areas are necessary to ensure the outcome of this performance measure:

- Improve nuclear heat source (core) design and analysis methods and develop improved designs to satisfy service life requirements.
- Evaluate and test improved core manufacturing processes and inspection techniques to support extended life reactors.
- Examine removed fuel cells at end-of-life and perform non-destructive examinations of irradiated test specimens to confirm predicted performance and validate design methods.
- Develop improved nuclear fuel, core and reactor structural materials which extend core lifetimes up to the life of the ship, and evaluate irradiation tests of new and existing materials to verify acceptable lifetime performance and to improve predictive capabilities.
- Test and evaluate plant materials to characterize the long term effects of the harsh operating environment and qualify improved materials and processes to ensure endurance requirements will be met.
- Conduct irradiations testing and perform detailed examinations to provide data for material performance characterization and prediction.

- **Complete scheduled design, analysis, and testing of reactor plant components, systems, and performance to ensure the operational safety and reliability of reactor plants for use in Navy nuclear powered warships so they can fulfill their national defense mission.**

Naval Reactors expects to be responsible for the operation of on average over 100 reactors powering 40% of the Navy's major combatants. This is equal to the entire U.S. commercial nuclear power generating industry and nearly as many reactors as the next two largest nuclear power generating nations combined (France and Japan). These plants operate over lifetimes of up to five decades. Challenges to the reliability and integrity of the plants change and grow over the long life. Continuous monitoring and analyses are thus vital to ensure they continue to perform safely and reliably. Also, new knowledge gained during the years of operation must be assessed against the operating plants.

Since nuclear powered warships account for such a large portion of the Navy's combatant fleet, the successful operation of the reactor plants is a key factor in the Navy's ability to perform its national defense role. To date, nuclear powered ships have steamed more than 115 million miles without a reactor accident or a significant release of radioactivity to the environment. The continued ability of the Navy to benefit from nuclear propulsion is dependent on continuance of this record.

The following activity areas are necessary to ensure the outcome of this performance measure:

- Design and test improved reactor equipment including advanced control rod drive mechanisms.
- Perform physics testing and analysis to confirm expected fuel system and core performance and develop improved analysis methods for predicting core performance that reduce design approximations, uncertainties, and associated conservatism.
- Conduct reactor safety and shielding analyses for nuclear reactor plants to ensure containment of radiation and proper protection of personnel.
- Ensure satisfactory reactor plant operation throughout life and improve steam generator, energy conversion, and steam generator chemistry technologies to enhance performance and reduce maintenance costs.
- Develop instrumentation and control equipment to replace obsolete equipment and improve reliability and performance.
- Develop and test reactor plant components and applicable technologies which address known limitations and improve performance and reliability of components.
- Perform reactor plant analyses to assure safe operation and improve reactor plant chemistry controls to reduce corrosion and plant radiation levels.

■ **Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.**

One of the greatest advantages provided by submarines is stealth. Stealth allows submarines to operate undetected, conducting surveillance or performing offensive missions with minimal concern for defensive needs, providing, in effect, a tremendous force multiplier. This capability must be maintained in the face of ever improving means of detection. In order to do so, Naval Reactors must ensure the reactor components and systems used in submarines meet tightening Navy operating parameters for quieting.

The following activity area is necessary to ensure the outcome of this performance measure:

- Develop and qualify improved core and reactor component thermal and hydraulic designs.

- **Maintain a utilization factor of at least 90% for prototype plants to ensure their availability for scheduled testing, training, and servicing needs, and provide for development of servicing equipment and testing of plant components, materials and procedures.**

  Naval Reactors has two operating land based prototype Naval nuclear propulsion plants at the Kesselring site in New York and also is the principal customer of the Advanced Test Reactor (ATR) located at the Idaho National Engineering and Environmental Laboratory.

  The prototype plants in New York are an essential component in meeting Naval Reactors' mission of ensuring the safe and reliable operation of Naval reactor plants. Prototypes provide platforms for conducting testing under actual operating conditions, which can not be duplicated in the laboratory. This testing yields important technical data and experience, and allows potential problems to be identified and addressed before they occur in operating reactor plants. The prototypes are used to test new components and to verify reactor performance predictions by depleting the core faster than would be done in an operating shipboard plant. For example, the advanced fleet reactor, now used in the SEAWOLF Class attack submarine, has accumulated the equivalent of 15 years of fleet operation. The prototypes also are used to train Navy nuclear plant operators.

  Operation of the ATR provides a unique capability to irradiate test specimens, which are then examined to provide data on the effects of radiation on materials. The ATR's arrangement permits varying conditions within the reactor test loops allowing accelerated life testing of materials, a major benefit.

  The goal for operating the prototypes and the ATR is a 90% utilization factor. Utilization factor is a measure of prototype and ATR availability for planned testing, training, or maintenance. To meet this goal, Naval Reactors must be forward thinking in identifying potential problems before they occur.

  At the end of life, servicing organizations must remove the core from a reactor plant. This is an extremely critical operation given the radioactivity inherent in the spent fuel. If the reactor plant is to remain in service a new core must be installed at this point. Fuel transfer equipment is designed for safe operation under all possible normal and abnormal conditions, and thorough evaluations are made of the design and fabrication processes. Engineering models are tested to demonstrate proper operation and detailed procedures are prepared to cover use of the equipment.

  The following activity areas are necessary to ensure the outcome of this performance measure:

  - Operate land-based test reactor plants to provide for prototypical testing, core depletion analysis, and reactor plant operator training.
  - Service land-based test reactor plants to ensure they continue to operate safely and efficiently, and develop equipment and procedures to provide for safe and efficient servicing of nuclear reactor plants.
  - Operate and service the ATR to provide for materials irradiations testing.

- **Meet cost and schedule goals to safely and responsibly inactivate shutdown land-based reactor plants in support of the Department's environmental clean-up goals.**

  Naval Reactors has shutdown six prototype plants no longer required for testing. These six plants are located at three sites. Based on the projected future use of each one of those sites by Naval Reactors, different degrees of inactivation appropriately were chosen as the goals for the various facilities at the start of this effort. With the shutdown of the S1C plant, there is no future need for the Windsor Site. As such, Naval Reactors is demolishing all structures, remediating the area, recycling/disposing of waste material, and releasing the site for unrestricted use. While the S3G and D1G prototype plants at the Kesselring Site in New York are shutdown, Naval Reactors is still operating two prototype plants at that site. Thus, Naval Reactors intent has been to remove the reactor plants and engine room components from the shutdown plants, but leave the supporting buildings for potential future uses. At the NRF site in Idaho, Naval Reactors has shutdown all three plants -- S5G, S1W, and A1W; however, Naval Reactors will continue to operate the Expended Core Facility at that site for the long term. As a result, and in recognition of the other shutdown reactor plants on the INEEL site, the inactivation plan for NRF included defueling the shutdown plants, placing them in an environmentally benign lay-up condition, and remediating various facilities and supporting systems.

  Naval Reactors original intent was to complete the noted inactivation effort by 2002. To date, Naval Reactors has made good progress -- defueled six of the seven reactors (one plant has two reactors) with defueling work underway on the remaining reactor and, as noted below, work is well underway on other aspects of the inactivation. However, the need to fund other priorities within Naval Reactors Development precludes accomplishing the original schedule. Public opinion, publicized in numerous newspaper articles published during and after the Environmental Impact Statements public comment period for the New York and Connecticut prototype plants, support prompt inactivation. Prompt dismantlement is also consistent with the Department's environmental clean-up goals, and is the most efficient and cost effective approach to this work.

  The following activity areas are necessary to ensure the outcome of this performance measure:

  - Continue inactivation efforts at the Windsor site in Connecticut to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.
  - Continue inactivation efforts at the Kesselring Site in New York to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.
  - Continue inactivation efforts at the Naval Reactors Facility in Idaho to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.

- **Ensure no personnel exceed Federal limits for radiation exposure and no significant findings result from environmental inspections by state and federal regulators.**

  Over time, the harmful effects of materials previously thought safe such as asbestos and PCBs have become known. In addition, sensitivity has increased concerning the environmental quality of ground water and air. These trends have resulted in stricter government regulations on environmental quality. Despite these stricter government regulations, Naval Reactors continues to have an outstanding environmental performance record.

Since 1967, the Naval Reactors Program has voluntarily utilized a limit of five rem per year, and no Program personnel have received greater than five rem in a year since then. Additionally, we have had an aggressive program to minimize exposure to as low as reasonably achievable such that since 1980, no Program personnel have received over two rem in any one year. During 1997, average occupational radiation exposure for Program personnel was again a small fraction of the 300 millirem of radiation exposure received by an average American in one year due to radiation naturally present in the environment.

When properly and diligently dealt with, nuclear propulsion is a safe, efficient power source, and is environmentally less damaging than other sources. Naval Reactors cleans up after itself in a rigorous, environmentally safe, and correct manner - including properly maintaining our facilities.

The following activity areas are necessary to ensure the outcome of this performance measure:

- Conduct radiological control, environmental, and safety operations necessary to protect laboratory employees, minimize release of hazardous effluents to the environment, and comply with all applicable regulations.
- Conduct ongoing clean up of test facilities to reduce hazards to personnel, and reduce potential liabilities due to changing conditions or accidental releases.

- **Complete 90% of VIRGINIA class plant development and testing work by the end of FY 2000.**

The VIRGINIA class will provide needed capability for the Navy at an affordable price. Naval Reactors is well along on the reactor plant intended for this ship. This plant encompasses Naval Reactors most advanced component and system technology, with a life-of-the-ship reactor core, a simplified plant arrangement and fewer components compared to previous designs.

- **Complete initial development efforts on a reactor plant for a new aircraft carrier.**

On October 5, 1998, the Navy decided on nuclear propulsion for use in a future aircraft carrier class, designated CVNX. Since developing the reactor plant for the NIMITZ Class in the 1960's, we have designed and built three generations of new submarine reactor plants. Applying these developments to a reactor plant for CVNX will allow incorporation of significant design improvements for simplicity, maintainability, and reliability.

Performance Measure Funding Matrix

FY 2000

Performance Measures	Budget Categories (dollars in thousands)			
	Reactor Technology & Analysis	Plant Technology	Materials Development & Verification	Evaluation and Servicing
Meet Navy goals for extended warship operation, through:				
Nuclear heat source design and analysis methods	50,000			
Core manufacturing processes and inspection techniques	18,000			
Removed fuel cell and irradiated test specimen examination				18,000
Fuel, core and reactor structural material development & testing			43,800	
Plant materials development and testing			38,000	
Irradiations testing and examination			43,000	
Ensure safety and reliability of reactor plants, through:				
Reactor equipment design & testing	44,000			
Physics testing and analysis	20,000			
Safety and shielding analyses	13,000			
Steam generator, energy conversion, and chemistry technologies improvements		23,000		
Instrumentation and control equipment development		45,000		
Reactor plant components development & testing		35,200		
Reactor plant performance analyses and chemistry control		8,000		
Support Navy's acoustic requirements, through:				
Core and reactor component thermal and hydraulic design	16,000			
Ensure prototype plant availability, through:				
Operation of land-based test reactor plants				32,000
Servicing of land-based test reactor plants				14,000
Operation and servicing of the advanced test reactor				18,000
Inactivate shutdown prototype plants, through:				
Inactivation efforts in Connecticut				7,000
Inactivation efforts in New York				19,400
Inactivation efforts in Idaho				17,000
Maintain outstanding environmental performance, through:				
Radiological, environmental and safety operations	35,000			
Cleanup of test facilities				25,000

The funding profiles for the following performance measures are included as subsets of the above funding matrix, since the data was extracted without consideration to the broader applicability and benefit of the work to other reactor plant types. Much of Naval Reactors' technology is generic in nature as all Naval reactor plant types are based on pressurized water reactor technology. As such, demarcating work between plant types and between operating plant and new plant development efforts is arbitrary, and not properly reflective of the way work is actually accomplished. However, this table does give insight into the effort benefitting the next generation and new aircraft carrier reactor plant developments.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Next Generation Reactor plant development and testing	80,000	50,000	40,000
Development of new reactor plant for a future aircraft carrier	35,000	60,000	80,000

Significant Accomplishments and Program Shifts

- With the declining number of ships, the Navy's dependence on each ship grows as they are called upon to rapidly respond to crises world-wide. Nuclear-powered warships, which will continue to comprise 40% of the Navy's major combatants, offer significant advantages in dealing with widely dispersed crises and threats with fewer ships -- their stealth, firepower, versatility, virtually unlimited high-speed endurance, and independence from logistics support make these ships especially well-suited to the future missions of the Navy. Nuclear powered submarines are typically the first U.S. forces to arrive on scene. They reconnoiter and secure the area for following forces. For example, in 1996, submarines were an essential component of the Navy force deployed to the Taiwan strait, chosen for their surveillance capabilities and specialized, hard-to-detect weaponry. Aircraft carriers provide our most visible forward presence. The nuclear carrier can sprint from one theater to another without stopping to refuel and can remain on station a higher percentage of the time than conventional carriers. These advantages were demonstrated recently by the USS NIMITZ's 7000 mile high speed transit from the South China Sea to the Arabian Gulf and by the transit of the USS GEORGE WASHINGTON from the Mediterranean Sea to the Arabian Gulf.
- Naval Reactors' careful engineering and approach to safety ensured the Program has never had a Naval nuclear accident or significant release of radioactivity to the environment. This environmental and safety record has endured almost 50 years and has been essential to nuclear-powered warships safely steaming over 115 million miles. This accomplishment is the result of thorough development, testing, and analysis of cores, components, and systems; stringent quality standards and rigorous training; and detailed analysis of operating components/plants to verify expected performance. The former Soviet Navy's nuclear propulsion safety record offers a stark contrast — they suffered casualties because of risks and inadequacies the U.S. would not tolerate.
- As the operating lives of Naval nuclear plants are extended beyond their original design lifetimes, Naval Reactors' efforts are intended to ensure these plants continue to perform safely and reliably. Careful, detailed validation and improvement efforts are necessary to support the Navy's decision to keep ships in service for up to 40-50 years vice original expectations.
- Continuing development efforts are yielding greater capabilities. Ongoing efforts in metallurgy,

thermal hydraulics, instrumentation and control, structural mechanics, manufacturing processes, physics, and nuclear design/analysis methods provide the base for future propulsion plant development and improvements to existing ones. Naval Reactors is investigating new structural materials, coolant chemistries, reactor plant arrangements, core configurations, manufacturing techniques, plant and facility monitoring equipment, and heat exchange methods. Features sought are enhanced power density, longer life, increased resilience, reduced corrosion, ease of operation, and affordability. Major efforts for the near future include upgrades to existing components and equipment to help extend operating ship lifetimes and improve overall reactor plant performance, development/testing of the next generation reactor components and systems for the Navy's VIRGINIA class -- including the first true life-of-the-ship core, which will obviate the need for expensive refuelings, and the new concept steam generator, which should greatly reduce corrosion concerns and improve acoustic performance -- and initial development of a reactor plant for a new aircraft carrier.

- The Program's cost-saving initiatives have led to shutting down six of eight land-based prototype plants. Naval Reactors is inactivating and laying up the shutdown plants to place them in an environmentally benign state pending full dismantlement at some future date. Efforts to reduce costs continue, but are not as dramatic.

Funding Profile

(dollars in thousands)

	FY 1998 Comparable Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Naval Reactors Development					
Plant Technology	112,900	111,100	0	111,100	111,200
Reactor Technology & Analysis	192,000	192,000	0	192,000	196,000
Materials Development & Verification	115,000	119,500	0	119,500	124,800
Evaluation & Servicing	166,020	163,589	0	163,589	149,400
Facility Operations	50,000	51,100	0	51,100	48,000
Program Direction	20,080	20,100	0	20,100	20,600
Subtotal, Naval Reactors Development	656,000	657,389	0	657,389	650,000
Construction	14,500	12,800	0	12,800	15,000
Subtotal, Naval Reactors Development	670,500	670,189	0	670,189	665,000
Use of prior year balances	-148	-4,049	0	-4,049	0
Total, Naval Reactors Development	670,352	666,140	0	666,140	665,000

Public Law Authorization:

Public Law 83-703, "Atomic Energy Act of 1954"

Executive Order 12344 (42 U.S.C. 7158), "Naval Nuclear Propulsion Program"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Bettis Atomic Power Laboratory	324,300	326,489	326,600	111	0.0%
Idaho National Engineering & Environmental Laboratory	50,100	48,200	49,650	1,450	3.0%
Idaho Operations Office	900	925	940	15	1.6%
Knolls Atomic Power Laboratory	273,500	272,875	266,610	-6,265	-2.3%
Pittsburgh Naval Reactors Office	5,800	5,800	5,900	100	1.7%
Schenectady Naval Reactors Office	4,900	5,200	5,300	100	1.9%
All Other Sites	11,000	10,700	10,000	-700	-6.5%
Subtotal, Naval Reactors Development	670,500	670,189	665,000	-5,189	-0.1%
Use of prior year balances	-148	-4,049	0	+4,049	0%
Total, Naval Reactors Development	670,352	670,189	665,000	-1,140	-0.1%

Site Description

Bettis Atomic Power Laboratory

The Bettis Atomic Power Laboratory is a government-owned, contractor-operated laboratory solely dedicated to Naval nuclear propulsion work. Bettis' mission is directed toward ensuring the continued safe and reliable operation of nuclear reactor propulsion plants for Naval surface ships and submarines through design, development, testing and operational follow. Bettis has a specialized testing facility for full scale steam generator testing, a control drive mechanism test facility and the expended core facility in Idaho for examination of spent nuclear fuel.

Idaho National Engineering & Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is a multi-disciplinary laboratory that applies its engineering and scientific capabilities to key national security areas such as reactor safety and improvement, waste removal and advanced energy production. Naval Reactors funding at the INEEL is for activities conducted at the site's Advanced Test Reactor (ATR). The ATR is the only facility in the Nation capable of performing material irradiation testing. The facility is Naval Reactors' main source of data on the performance of reactor fuel, poison, and structural materials under irradiated conditions.

Idaho Operations Office

The Idaho Operations Office provides review and approval of technical safety requirements, criticality safety activities, restart authorizations and oversight of the Idaho National Engineering & Environmental Laboratory to verify safety and administrative compliance.

Knolls Atomic Power Laboratory

The Knolls Atomic Power Laboratory is also a government-owned, contractor-operated laboratory solely dedicated to Naval nuclear propulsion work. KAPL's mission also is directed toward ensuring the continued safe and reliable operation of nuclear reactor propulsion plants for Naval surface ships and submarines through design, development, testing and operational follow. KAPL has fuel manufacturing development capabilities, unique thermal-hydraulic test capabilities, and two prototype nuclear propulsion plants at the Kesselring Site for operational testing of new technologies under typical operating conditions prior to fleet introduction.

Pittsburgh Naval Reactors Office

The Pittsburgh Naval Reactors Office maintains oversight of the Bettis Atomic Power Laboratory.

Schenectady Naval Reactors Office

The Schenectady Naval Reactors Office maintains oversight of the Knolls Atomic Power Laboratory.

All Other Sites

Naval Reactors Headquarters administers the Naval Nuclear Propulsion Program. The Lawrence Livermore National Laboratory Atmospheric Release Advisory Capability provides the emergency response and management efforts related to real-time consequence assessment of atmospheric release of radioactive and toxic chemical material. The Oak Ridge National Laboratory Radiation Shielding Information Center performs collection evaluation and dissemination of information related to nuclear radiation transport.

Plant Technology

Mission Supporting Goals and Objectives

Plant Technology encompasses development, testing and analysis of components and systems which transfer, convert, control and measure power created by the reactor. Components sustain wear through operation that threatens reactor plant integrity, and new components and systems are needed to support new applications either in existing or new reactor plants. Thus, the principal thrust is to develop and apply predictive, analytic, and testing tools to find potential problems to enable corrective actions and the continued safety of operating plants. This, or changing performance requirements, may lead to the need to develop new or modified components and systems. The advances achieved in the various applicable technologies such as manufacturing/welding processes, fluid dynamics, models and analysis methods and thermal-hydraulics have enhanced operating plant performance and allowed major improvements in performance for new reactor plants. For example, the reactor plant now under development for the VIRGINIA class will be simpler, hence more reliable, and more power dense than previous plants because of the continuing advances. These advances and the results of continuing technological progress are being assessed for possible use in a reactor plant for a new aircraft carrier with development expected in future years.

A reactor plant provides a harsh environment for machinery. The constant exposure to water at high temperature and pressure is corrosive. Harmful corrosive environments exist in the steam generators due to the intense boiling environment inherent in the transfer of reactor heat to the turbines. Besides dealing with this continuing problem, Naval Reactors is pursuing technologies to greatly reduce corrosion through fundamental design changes. Also, machinery such as pumps with constantly rotating or operated parts wear and require lubrication. Obviously, to the extent this wear can be abated through the application of better materials and lubricants, as well as more resilient designs, the longer and more reliable the component and system. A constant concern is in improving or correcting one area, another will be made worse thus necessitating extensive and comprehensive testing.

Likewise, a continuing effort is devoted to applying the latest advances in electronics to instrumentation and control equipment and systems. Due to rapid degradation and obsolescence, this equipment must be replaced during the lifetime of an operating plant. While this presents a continuing challenge, there are advantages to this given the rapid technical advances. For example, the accuracy and reliability of the instrumentation can affect the useable power obtained from the reactor.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Plant Technology	112,900	111,100	111,200	+100	0.1%
Total, Plant Technology	112,900	111,100	111,200	+100	0.1%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
I. Complete scheduled design, analysis, and testing of reactor plant components, systems, and performance to ensure the operational safety and reliability of reactor plants for use in Navy nuclear powered warships so they can fulfill their national defense mission.			
A. Ensure satisfactory reactor plant operation throughout life and improve steam generator, energy conversion, and steam generator chemistry technologies to enhance performance and reduce maintenance costs.			
Steam generators must provide a safe interface between the reactor plant and the power turbines, transferring heat from the reactor plant to produce steam to run the power turbines. Hot water from the reactor flows through a bundle of thin-walled tubes within the steam generator. A shell containing the turbine water surrounds these tubes where it is boiled to steam. The integrity of steam generator components must be maintained in order to prevent radioactive contamination of the steam which is piped out of the steam generator to the power turbines.			
Maintaining steam generator integrity requires development of water chemistries and evaluation of corrosion effects. Trace impurities can become highly concentrated by the boiling process in areas of low flow and form deposits. The concentration of impurities in these deposits becomes corrosive and threatens the integrity of the unit. Development efforts are therefore required to evaluate potential corrosion mechanisms, devise methods to locate and remove deposits, minimize input of these impurities and continually test water chemistries and corrosion inhibitors for benefits and drawbacks to ensure they mitigate the consequences of these impurities.			
Development is also underway to test other ways to transfer energy. For example, the intent of the new concept steam generator is to minimize the propensity for concentration of impurities and eliminate low flow regions resulting in an inherently more corrosion resistant, reliable design. Efforts concentrate on building test units to demonstrate and qualify the process on a large scale. These test units will then be used to confirm the expected performance benefits.	35,000	25,000	23,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Examine steam generator sludge and corrosion samples to characterize thermal hydraulic, chemistry and corrosion behavior.

Perform testing of chemistry additives and corrosion inhibitors for eventual long term use.

Begin design of in-plant corrosion monitors for more detailed examination of chemistry and corrosion trends in several types of steam generators.

Continue fabrication of the new concept steam generator manufacturing demonstration unit full assembly and prepare for performance testing.

FY 1999 Evaluate steam generator sludge/corrosion samples and compare to test results to develop improved corrosion control and predictive tube corrosion models.

Continue testing necessary for long term use of potential new chemistry additives and corrosion inhibitors.

Continue design and begin testing in-plant corrosion monitors for several types of steam generators.

Initiate the manufacturing demonstration unit thermal and hydraulic testing.

FY 2000 Continue steam generator simulator testing and analysis for development of improved corrosion control and predictive models.

Continue testing of chemistry additives and corrosion inhibitors for long term use.

Accomplish additional testing of several types of steam generators with advanced in-plant corrosion monitors.

Identify and incorporate improvements to the new concept steam generator technology based on lessons learned from the manufacturing demonstration unit testing.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
B. Develop instrumentation and control equipment to replace obsolete equipment and improve reliability and performance.			
Naval reactor plants rely on instrumentation to monitor plant conditions, take corrective action and determine position and speed of the control rods used to regulate the reactor. Safe and reliable operation of the plant is dependent on the reliability and performance of this equipment. In addition, highly accurate and reliable equipment can increase actual usable power available from the reactor.			
Rapid technical advances in the electronics industry provide opportunities to improve equipment. The downside of these advances is rapid obsolescence because industry does not maintain the parts or capability to support older equipment. Due to its nature -- circuit cards and numerous interconnected small electrical components -- and obsolescence, lifetimes are much more limited than for heavy reactor equipment. As a consequence, this equipment must be replaced periodically over the life of a plant. Development concentrates on adapting equipment to reactor plant specifications that are more functionally integrated, less costly to support and more flexible to more easily incorporate future technological advances. The focus is on solid-state, microprocessor-based electronics technology which is simpler, more reliable and quieter.	45,900	41,000	45,000

Verifiable Supporting Activities:

FY 1998 Modify standardized instrumentation and control designs to incorporate lessons learned from testing and begin hardware qualification testing.

Develop engineering models of advanced pressure and flow sensors to be compatible with standardized instrumentation and control systems in various reactor plant types.

Complete compatibility testing of a new rod control system for the next generation reactor rod drive mechanisms.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000

FY 1999 Continue qualification testing of standardized instrumentation and control hardware and continue design documentation of system software.

Continue engineering model development and testing of advanced pressure and flow sensors and prepare for qualification testing.

Examine potential instrumentation and control technologies for application in a reactor plant for a possible new aircraft carrier.

Begin development of instrumentation for OHIO and LOS ANGELES class submarine reactor plants using standardized building blocks.

FY 2000 Conduct testing of various standardized instrumentation applications, conduct qualification testing of software building blocks and modify as necessary.

Continue development of instrumentation for OHIO and LOS ANGELES Class submarine reactor plants using standardized building blocks.

Perform qualification testing of advanced pressure and flow sensors to ensure compatibility with standardized instrumentation and control.

Begin identification of functional requirements for a new aircraft carrier reactor plant instrumentation system.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
C. Develop and test reactor plant components and applicable technologies which address known limitations and improve performance and reliability of components.			
Naval Reactors evaluates current technologies and applies them to develop simpler components which maximize plant efficiency, reliability and safety. For example, the main coolant pump used in the NIMITZ Class carrier reactor plant, originally designed in the early 1960's, is being redesigned for backfit to incorporate current technologies which will address known problems and thus improve its performance and enhance reliability over the pump's operating life.			
Effort also is focused on optimizing reactor plant arrangement to achieve simplicity, resulting in fewer components. The fewer the number of components and systems, the less the maintenance, space and power needs. This results in cost savings, enhanced reliability, greater ease of operation and more power available for other uses in the ship. An important consideration is flow through each component and system in the reactor plant because the pressure drop associated with each component has an affect on flow through the core. Deviations from nominal flow can cause a heat level imbalance within the core, thus tight tolerances are necessary to ensure the entire plant operates safely and efficiently	23,000	36,100	35,200

Verifiable Supporting Activities:

FY 1998 Perform next generation reactor coolant pump qualification testing.

Finalize redesign of the main coolant pump used in the NIMITZ Class carrier reactor plant and begin fabrication of the qualification unit.

Begin feasibility studies of components and systems for a reactor plant for a new aircraft carrier in support of the Navy's assessment of alternatives.

(dollars in thousands)

		FY 1998	FY 1999	FY 2000
FY 1999	Develop the next generation reactor primary fluid system design and complete coolant pump qualification testing.			
	Complete qualification unit fabrication and initiate qualification testing of the redesigned NIMITZ Class carrier main coolant pump including flow testing.			
	Continue feasibility studies and initiate conceptual definitions of a reactor plant for a new aircraft carrier.			
FY 2000	Complete test procedures associated with initial construction of the next generation reactor.			
	Continue qualification and flow testing of the redesigned NIMITZ Class carrier main coolant pump.			
	Initiate design of components, such as the main coolant pump and pressurizer, and arrangements for the reactor plant for a new aircraft carrier.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
D. Perform reactor plant analyses to assure safe operation and improve reactor plant chemistry controls to reduce corrosion and plant radiation levels.			
The reactor core heats water which flows through the steam generator. The steam generator transfers the heat to the turbine cycle water by producing steam for power . Any corrosion products present in the reactor water will be carried through the plant and irradiated in the core. Additionally, excessive build-up of corrosion products in the core acts as insulation and narrows water channels, reducing flow and heat transfer.			
Chemistry controls are aimed at reducing corrosion. Development effort aims at maintaining water chemistry within operating parameters to provide as benign an environment as possible, thus protecting the components and systems of the reactor plant. A key factor in the development process is a continuous flow of data from test facilities and operating plants.			
Detailed reactor system performance analyses are also performed to ensure naval reactor plants are safe during normal, transient and casualty conditions. The performance analyses establish operating limits and automatic protection systems set points which ensure the plant will operate safely and reliably during operation.			
Through continuous improvement in chemistry, reactor protection system analyses and advances in metallurgy discussed in the Materials Development and Verification category, Naval Reactors has been able to maintain consistently low radiation levels while enhancing reliability and correspondingly reducing maintenance costs.	9,000	9,000	8,000
Verifiable Supporting Activities:			
FY 1998 Perform verification of the core performance model by comparing with expended core data.			
Begin to evaluate an alternate chemistry for reactor water treatment in several types of reactor plants.			
Begin the initial start-up reactor protection analysis for the next generation reactor.			
Conduct channel closure/ end-of-life reactor systems performance analysis for the advanced fleet reactor.			

(dollars in thousands)

		FY 1998	FY 1999	FY 2000
FY 1999	Continue analysis of core performance by isolating the effects of water acidity and temperature.			
	Continue the alternate chemistry treatment test for possible future use in several plant types.			
	Perform the protection analysis for the next generation reactor.			
	Initiate analysis to extend advanced fleet reactor protection basis to end-of-life.			
FY 2000	Incorporate results of isolation tests in the core performance model.			
	Conclude whether to implement alternate chemistry use for reactor water treatment on several plant types.			
	Perform the initial start-up test protection analysis for the next generation reactor, and develop a design basis for the reactor protection analysis under abnormal operating conditions.			
	Continue end-of-life advanced fleet reactor performance analysis.			
Total, Plant Technology		112,900	111,100	111,200

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ I.A Decreases to reflect progress on new concept steam generator.	- 2,000
■ I.B Increases to support Instrumentation and Control design and development for new aircraft carrier.	+4,000
■ I.C. Decreases to reflect refinement in designs for an improved main coolant pump	-900
■ I.D. Decrease reflects progress in performance analysis for next generation reactor.	- 1,000
Total Funding Change, Plant Technology	+ 100

Reactor Technology & Analysis

Mission Supporting Goals and Objectives

The work in this category ensures the continued safe operation of existing reactors, and develops new reactors with improved power capabilities, endurance, reliability and efficiency, and greater simplification. Reactor Technology and Analysis efforts support the performance measures of meeting Navy goals for extended warship operation, ensuring the operational safety and reliability of reactor plants for Navy warships, supporting Navy acoustic requirements, and ensuring continued excellence in radiological and environmental control.

Improved nuclear heat source design and analysis methods are needed to satisfy service life requirements. Limitations in these analytical techniques necessitate design conservatism, which must be reduced to increase the operating margin for reactors. Emphasis in this area is on thermal-hydraulics, structural and fluid mechanics, vibration analyses and nuclear core design and analysis work to more accurately predict reactor performance and reduce design conservatism. Improved core manufacturing processes and inspection techniques also are being pursued to support extended life requirements.

Effort also is underway to improve analysis tools and understanding of basic nuclear data. This will aid in improving Naval Reactors ability to predict performance over the longer lifetimes. Other efforts in this area are dedicated to designing and testing simpler, more reliable reactor equipment; performing analyses to ensure reactor safety; and developing improved shield designs to reduce cost and radiation levels.

Development and qualification of core and reactor component thermal and hydraulic designs is aimed at improvements in power and flow which facilitate improved acoustic performance. Radiological and environmental monitoring and controls ensure operations are conducted without adverse impact on employees or the environment

Funding Schedule

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Reactor Technology and Analysis	192,000	192,000	196,000	+4,000	0.021
Total, Reactor Technology and Analysis	192,000	192,000	196,000	+4,000	+2.1%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
I. Conduct planned development, testing, examination and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods to ensure Naval nuclear reactors are able to meet Navy goals for extended			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
A. Improve nuclear heat source (core) design and analysis methods and develop improved designs to satisfy service life requirements.			
The reactor design codes used in support of current designs were necessarily constrained in their modeling capability due to computational limitations and limited test data. As a result of the limitations in design codes, conservative procedures and designs are necessary to ensure safety and acceptability.			
However, supporting extended service life requirements necessitates reducing this design conservatism to extend the operating margin for current reactors. Reducing this conservatism safely requires extensive testing to provide data for the qualification of new analytical models and to aid in establishing new, or revising existing, core performance criteria. Engineering analyses and testing in the areas of nuclear analysis, thermal-hydraulics, structural mechanics, fluid mechanics, dynamic structural load tests and vibration are needed to confirm the acceptability and performance of the core and reactor components.			
Extended service life requirements are also being met through development of improved designs, such as the next generation reactor for the Navy's VIRGINIA class and in the future an improved reactor for future aircraft carriers. The core for the VIRGINIA class will be the first designed from inception to last the life of the ship. Development effort for new core designs entails validating key structural, thermal-hydraulic, and nuclear calculations to provide design assurance. Key components and design features are tested under prototypic operating conditions to demonstrate the mechanical, thermal-hydraulic and flow-induced vibration acceptability of the design and manufacturing processes	61,000	52,000	50,000

Verifiable Supporting Activities:

FY 1998 Conduct shock and vibration testing of the next generation reactor mechanical test cell and commence analysis of results.

Develop detailed design of test program to qualify fluid mechanics and thermohydraulic models.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

FY 1999 Assess and resolve implications of reactor test program on design margin and design bases for next generation reactor.

Assess feasibility and potential benefits of high temperature reactor concepts.

Initiate qualification of improved reactor code and design procedures using thermal-hydraulic data.

Initiate conceptual design of an advanced core for use in a reactor plant intended for a new aircraft carrier.

FY 2000 Incorporate experimental results to update analysis methods for the next generation reactor. Review engineering designs, analyses and test work to assure next generation reactor will perform as expected.

Evaluate technical requirements for reactors with high temperature capability.

Develop and qualify code and design procedure using test data.

Initiate reference design for an advanced core for use in a reactor plant intended for a new aircraft carrier.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
B. Evaluate and test improved core manufacturing processes and inspection techniques to support extended life reactors.			
Earlier Naval core designs result in hot spots in the fuel during operation, and margins are built into the fuel designs and operating limits to compensate. The current fuel manufacturing process, the Modified Fuel Process (MFP), reduces hot spots and allows cores to operate with higher energy density needed for longer endurance. However, this process is expensive and technically challenging. Continuing effort is aimed at improving fuel manufacturing to develop a process which can deliver a high power core at lower cost.			
Naval Reactors needs manufacturing process improvements to support new core design features, discussed above, and must develop new processing methods to manufacture cores with improved capabilities to meet design requirements and objectives. In addition, the experience gained by doing manufacturing and inspection process development can be applied in ensuring manufacturability of new core designs and preparing manufacturing contract specifications.			
The intent of manufacturing and inspection development efforts also is to reduce cost compared to current processes. Other efforts include developing more cost-effective processes for fuel elements, fuel assemblies, and core structural components. Test specimens are manufactured for in-reactor tests to qualify design and process changes for ultimate application in core design and manufacturing.	20,000	15,000	18,000

Verifiable Supporting Activities:

FY 1998 Establish manufacturing capability to pilot advanced fuel process concepts.

Develop advanced systems with reduced cost.

FY 1999 Conduct initial demonstration of the new fuel system manufacturing process.

Continue development of advanced fuel systems.

Investigate new manufacturing and inspection technologies to reduce core cost and improve core

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
FY 2000 Model key manufacturing processes and demonstrate advanced processing technologies on mockups.			
Begin qualification of advanced fuels and processing techniques.			
Develop new and emergent manufacturing and inspection technologies to improve core operation, solve technical problems and reduce core cost.			
II. Complete scheduled design, analysis, and testing of reactor plant components, systems, and performance to ensure the operational safety and reliability of reactor plants for use in Navy nuclear powered warships so they can fulfill their national defense mission.			
A. Design and test improved reactor equipment including advanced control rod drive mechanisms.			
The control rods directly control reactivity in the reactor. Regulation of the reactivity, and reactor safety and reliability, demand the mechanisms which drive the control rods perform without incident.			
Current mechanism designs are based on 1960s technology. Development efforts are focussed on incorporating a new design which would virtually eliminate inadvertent scrams and improve reliability of performance. Other planned improvements include: a simpler design, improved lifetime features, and additional operating flexibility.			
New reactor heavy equipment, including reactor vessel, closure head, closure studs, and a core basket, also must be developed and qualified to accommodate new core designs. Effort during the budget period is focussed on the equipment for the next generation reactor and for a reactor for a new aircraft carrier. Detailed three-dimensional structural analyses are performed to ensure these important components are not over stressed	29,000	39,000	44,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Test and resolve design issues for extended life of control rod drive mechanisms.

Perform testing of control drive mechanism lead units, including life, thermal, and shock and vibration testing.

Carry out design/structural analysis validation and continue fit up and alignment studies of reactor equipment for the next generation reactor.

Conduct analysis of stress-strain relationships and cyclic loading.

FY 1999 Conduct control drive mechanism lead unit life testing and examinations.

Begin life testing of prototypical production unit control drive mechanisms.

Evaluate concepts for control drive mechanisms for a new aircraft carrier.

Assess sizing of reactor equipment for a new aircraft carrier based on analytical and experimental methods.

FY 2000 Complete remaining control drive mechanism lead unit testing, examination and reports.

Perform any needed testing and resolve design issues arising from receipt inspection or power unit assembly for the next generation reactor.

Initiate reference designs for reactor equipment and an improved control drive mechanism for use on a new aircraft carrier.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
B. Perform physics testing and analysis to confirm expected fuel system and core performance and develop improved analysis methods for predicting core performance that reduce design approximations, uncertainties, and associated conservatism.			
The first cores Naval Reactors developed had expected service lives of two years. Subsequent development efforts have allowed extending this service life to over twenty years, and development is underway to deliver a life-of-the-ship core which will last over thirty years. While yielding significant advantages in terms of reduced radiation exposure, reduced cost, and increased ship availability, the longer core life is pushing nuclear analysis tools beyond proven experience. These tools are limited in their ability to accurately predict core physics performance at later phases of life. Naval Reactors is developing improved methods and tools to provide continued assurance of safe and reliable operation at stages in life which extend well beyond current operating experience.			
In addition, current physics methods use approximations which limit design precision and require allowances be built into the design. Naval Reactors is improving design methods and software to reduce the degree of conservatism. For example, advancements in computer capability are being exploited to provide more precise calculations of core performance over lifetime. This will allow a reduction in uncertainties and biases currently applied to core reactivity predictions. These reductions can lead to reduced costs and improved reactor performance through more accurate predictions of power levels in the various regions of a core under transient and steady-state conditions.			
Qualification of these improved analytical and design methods requires extensive testing; comparison of calculations to experimental results and operating experience; and validation of predictions against prototype core measurements. Differences between calculations and experimental results are resolved and the results factored into improved methods and computer programs. Efforts also are focussed on improving measurements of basic nuclear data and determining experimental programs required to improve the data. This includes measurement of nuclear cross sections which underlie all reactor physics calculations	21,000	20,000	20,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Analyze physics results from middle-of-life operation of the advanced fleet reactor prototype core.

Correlate advanced fleet reactor physics data to expand model qualification base.

Achieve improvement in speed for deterministic solution of neutron transport equation.

Establish core concepts to support design basis decisions for a reactor for a new aircraft carrier.

Conduct physics analysis of expended fuel data from the S8G prototype core to confirm predictions and methods.

FY 1999 Evaluate advanced fleet reactor prototype physics data for the most reactive time in life.

Develop a parallelized version of the Monte Carlo program to achieve a large reduction in time for solving the neutron transport equation.

Develop affordable core design concepts to support design basis for a reactor for a new aircraft carrier.

Analyze physics data from the D2W prototype expended core examination.

		(dollars in thousands)		
		FY 1998	FY 1999	FY 2000
FY 2000	Evaluate physics data from late-in-life operation of the advanced fleet reactor and qualify model predictions against the measured data.			
	Incorporate improvements to major nuclear design programs.			
	Start reference design effort for more affordable core design for an advanced aircraft carrier.			
	Apply improved physics methods, modeling procedures and cross section data to reduce reactivity bias.			
	Analyze physics data from the NIMITZ prototype expended core examination to validate physics predictions and methods.			
C. Conduct reactor safety and shielding analyses for nuclear reactor plants to ensure containment of radiation and proper protection of personnel.				
Naval Reactors conducts reactor safety analyses of all plants and new core designs to confirm the adequacy of the design and assure public health and safety. Safety assessments are conducted for specific reactor plant designs to identify any potential safety vulnerabilities and to assess the likelihood of a core damaging casualty. Severe accident assessments are conducted for specific reactor plant designs to evaluate containment integrity for postulated accident scenarios.				
In addition, shielding analyses are conducted to ensure containment of radiation and continued safe operation. New shield materials are sought to improve shield effectiveness, while eliminating the use of hazardous materials such as lead. Shielding methods improvements more accurately predict the effectiveness of the radiation shielding and the extent of radiation reactor components and materials receive. This allows shielding to be better optimized to reduce radiation exposure to personnel and equipment during reactor plant and servicing operations and during the handling and shipment of spent nuclear and other highly radioactive materials		11,000	13,000	13,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Verifiable Supporting Activities:			
FY 1998 Improve analysis methods.			
Continue no-lead shield design with evaluation of alternatives for eliminating lead from shielding.			
FY 1999 Further develop analysis methods.			
Complete the CVN 77 shield design.			
Develop and qualify improved shield design methods.			
FY 2000 Develop and qualify improved shield design methods.			
Establish initial design methods for a reactor intended for a new aircraft carrier.			
III. Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.			
A. Develop and qualify improved core and reactor component thermal and hydraulic designs.			
Work in this area is focused on improving thermal hydraulic analytical models and codes. Improved tools will enable a more accurate determination of flow requirements, increasing the margin between operating conditions and performance limits.			
For additional explanation, please refer to classified addendum.	18,000	19,000	16,000

(dollars in thousands)		
FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Initiate model and code development and fundamental testing to extend the advanced computational fluid dynamics code.

Evaluate application of modified hydraulic design to future core designs.

FY 1999 Develop models and perform fundamental testing for the application of the advanced computational fluid dynamics code to additional areas.

Develop models and conduct testing to extend the qualified range of the thermal and hydraulic design procedures.

Develop models and conduct testing for extension of modified hydraulic design code to future core designs.

FY 2000 Validate and qualify advanced computational fluid dynamics code for additional application.

Validate the advanced code for use in modified hydraulic design analysis.

Develop and qualify improved shield design methods.

Establish initial design methods for a reactor intended for a new aircraft carrier.

IV. Ensure no personnel exceed Federal limits for radiation exposure and no significant findings result from environmental inspections by state and federal regulators.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
A. Conduct radiological control, environmental, and safety operations necessary to protect laboratory employees, minimize release of hazardous effluents to the environment, and comply with all applicable regulations.			
Radiological materials must be properly controlled to protect the health and safety of workers, the public and the environment. Naval Reactors has developed and enforces strict compliance with requirements for safe handling and disposal of radiological material. Additional procedures are in place to ensure environmental compliance. The principal focus of these environmental efforts is to prevent the generation of environmental hazards, by reducing wastes and preventing pollution.			
Training is conducted to ensure radiological, safety and environmental requirements are understood. In addition, personnel and affected work areas receive routine radiological monitoring to ensure exposure is within minimal limits. Environmental monitoring confirms operations do not impact the surrounding community, and emergency response capabilities are in place to control or mitigate any problems.	32,000	34,000	35,000
Verifiable Supporting Activities:			
All Years Survey and document radiological conditions; train personnel for all phases of radiological work and environmental work.			
Minimize the production and safely dispose of all waste in accordance with applicable regulations.			
Audit compliance to all regulations to ensure effectiveness of controls			
Total, Reactor Technology & Analysis	192,000	192,000	196,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■I.A. Decrease in nuclear heat source design reflects progress on development of next generation reactor	-2,000
■I.B Increases to reflect development of reactor for a new aircraft carrier	+3,000
■II.A Increase in reactor equipment and control drive mechanism development reflects initiating concepts work for a reactor plant intended for a new aircraft carrier	+5,000
■III.A New computer codes with improved predictive capabilities result in streamlined processes used to qualify analytical design methods	-3,000
■IV.A Increase in radiological and environmental controls reflects inflation and increased effort to ensure compliance with all	+1,000
Total Funding Change, Reactor Technology & Analysis	+4,000

Materials Development & Verification

Mission Supporting Goals and Objectives

Materials Development & Verification provides the high performance materials necessary for Naval reactor plant applications. This work principally supports the performance measure to ensure Naval nuclear reactor plants are able to meet Navy goals for extended warship operation. Ensuring materials will withstand the rigors of the harsh environment -- irradiation, high temperature, high pressure, and corrosion -- over a number of decades is a central element to providing longer lived reactor plants. This challenge is compounded by the inability to examine or replace materials in the reactor plant once assembled. Thus, candidate materials must be identified and developed, and these materials, plus materials currently in use, must be extensively and strenuously tested to assure they can meet demand. The materials are also continuously reassessed based on evolving knowledge, and analytical and testing techniques.

Developing and qualifying these high performance materials requires conducting tests of varying periods, up to many years; collecting test data from prototypical specimens and materials removed from service; and assembling that data into improved predictive models. The ability of these models to accurately predict material performance is vital to operating plant safety and to qualifying materials for longer lifetimes.

Work in this category is divided into three areas: core and reactor structural materials, plant materials, and irradiations testing. The first two areas concern the different challenges and demands placed on materials based on their location and function. For example, core materials are subject to more intense irradiation and higher heat levels, while plant materials are more susceptible to stress and cracking. Irradiation testing is used to support both core and plant material development, but is highlighted to reflect the fundamental impact of radiation on material performance.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Materials Development & Verification	115,000	119,500	124,800	+5,300	4.4%
Total, Materials Development & Verification	115,000	119,500	124,800	+5,300	4.4%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
I. Conduct planned development, testing, examination and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods to ensure Naval nuclear reactors are able to meet Navy goals for extended warship operation.			
A. Develop improved nuclear fuel, core and reactor structural materials which extend core lifetimes up to the life of the ship, and evaluate irradiation tests of new and existing materials to verify acceptable lifetime performance and to improve analytical capabilities.			
Materials used in a reactor core as fuel, poison, cladding, and structural pieces must be capable of maintaining their mechanical integrity in an operating reactor environment which subjects them to the harmful effects of irradiation, pressure, corrosion, and heat. This demand is further exacerbated by their need to endure this harsh environment over increasing time periods. In order to support core life expectations of more than 30 years, development and testing of economically attractive materials with improved physical or nuclear characteristics is being pursued. Improvements in material characteristics offer the potential for increased core lifetime, reductions in analytical conservatism and cost savings.			
The ability to qualify materials for specific applications is dependent upon fabrication process development, and through testing and development of predictive models to cover design applications. Materials used in long life core designs must be qualified in advance by collecting data on their performance during tests, examining their condition after testing and at end of use, and assembling the collected data into sound predictive models	37,000	40,500	43,800

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

Materials work supporting long life core concepts, by nature, involves extended testing conducted over many years. The verifiable supporting activities described below provide examples of materials data generated each year thus representing outcomes within the continuing general scope of work.

FY 1998 Develop an improved predictive model for corrosion performance.

Complete next phase of post irradiation crack growth rate testing of X750 and A625 materials.

Develop improved fuel material processing technique to reduce costs and environmental wastes.

Conduct initial evaluations of fuel specimens subjected to various conditions in support of improved performance limits.

FY 1999 Upgrade fuel performance modeling to support improved fuel performance analysis.

Complete post irradiation crack growth rate testing to determine whether the effect of radioactive fluence on stress corrosion cracking resistance of X750 and A625 can be reduced.

Evaluate acceptability of fuel manufactured with a new production process that reduces cost and utilizes environmentally friendly materials.

Conduct destructive evaluation of fuel specimens which underwent performance testing and assess changes to design bases.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

FY 2000 Reevaluate model based on latest irradiated materials data.

Conduct testing of prototypic X750 fasteners to provide temperature dependencies for use in a predictive cracking model.

Complete interim evaluation of initial high temperature fuel material irradiations tests to assess performance.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
B. Test and evaluate plant materials to characterize the long term effects of the harsh operating environment and qualify improved materials and processes to ensure endurance requirements will be met.			
Materials used throughout the reactor plant are critical as degradation can lead to reduced performance, shorter lifetime, increased maintenance, or component failure. Consequently, Naval Reactors' efforts are focused on developing and qualifying materials to assure their endurance commensurate with the need to support increasingly longer lived nuclear cores. In dealing with material degradation, a leading concern is stress corrosion cracking, the damage potentially occurring to materials carrying high tensile loads exposed to fluids, radiation, or high temperatures. Other plant material concerns include embrittlement resulting from irradiation, and the use of cobalt in plant materials. Cobalt is used in certain alloys because of its contribution to strength and wear resistance, but has a propensity to remain irradiated longer than other materials, complicating servicing and inactivation. Development and qualification of low or non-cobalt materials is underway.			
Naval Reactors employs various methods to test, evaluate, and develop improved plant materials. For example, autoclave corrosion test facilities are used to create a hot, pressurized environment to recreate, under accelerated conditions, what the material would experience over a longer period of time in an operational reactor plant. Materials which have been in service are examined to provide critical operating data. In addition, destructive and non-destructive testing and examination provides valuable data on material performance and reliability. Non-destructive testing is generally less expensive and allows repeated examination of materials, as well as analysis of the material condition of components still in service, however, some key data on the strength and vulnerabilities of materials can only be obtained through destructive means. An example of destructive testing is measuring the onset of cracking in a material which is intentionally subjected to controlled destructive conditions of stress and corrosion.	40,000	39,000	38,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

Because understanding the long term behavior of materials and phenomenon such as stress corrosion cracking is an incremental learning process, the verifiable supporting activities described below represent accomplishments of milestones within the continuing overall effort.

FY 1998 Conduct destructive and non-destructive examinations of component samples removed from operating plants, including a post-service exam of an improved stress corrosion cracking resistant alloy.

Complete initial testing of new low-cobalt alloys and select candidates for continued development.

Conduct thermal embrittlement testing for pressure vessel materials made by the most current material fabrication process.

Complete testing to demonstrate adequacy of valve fasteners for an extended lifetime.

FY 1999 Continue stress corrosion cracking testing and evaluation and complete preliminary version of an advanced predictive model.

Conduct advanced testing of promising new low-cobalt alloys.

Complete first phase of program to evaluate effects of chemistry and material microstructure on irradiation damage in pressure vessel materials.

Improve testing capabilities by developing laser spectroscopy techniques to study low level contaminants in water and monitor stability of additives.

		(dollars in thousands)		
		FY 1998	FY 1999	FY 2000
FY 2000	Complete current phase of crack growth rate testing of corrosion resistant materials to support model refinements.			
	Continue development of low cobalt alloys.			
	Conduct testing to evaluate long term temperature and irradiation embrittlement behavior of a reactor vessel structural material.			
	Perform testing to extend lifetime of high strength fasteners.			
	Improve crack growth rate and corrosion fatigue testing capabilities by developing advanced non destructive testing methods and automated data acquisition techniques.			

C. Conduct irradiations testing and perform detailed examinations to provide data for material performance characterization and prediction.

Irradiation is the most invasive factor to which reactor materials are exposed, compounding the demands caused by other environmental factors. The Advanced Test Reactor (ATR), located at the Idaho National Engineering and Environmental Laboratory, is Naval Reactors' main source of data on the performance of reactor fuel, poison, and structural materials under irradiated conditions. ATR's high operating flux characteristics allow approximations of lifetime effects from nuclear reactor operation to be obtained in a much shorter time. While operation of the facility is funded in the Evaluation and Servicing budget category, work here includes fabricating test specimens for insertion into the ATR, designing irradiation test trains to expose materials to selected reactor conditions, and conducting post-irradiation detailed examinations to analyze how the material stood up to reactor operating conditions. Test trains are specially engineered structures which hold material specimens in place during irradiation, and are periodically inserted and withdrawn allowing acquisition of data from a wide variety of materials and configurations. The test train's internal arrangement and location in the ATR determines the exposure to specific conditions. 38,000 40,000 43,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Verifiable Supporting Activities:			
Testing and collection of data from these tests is an ongoing, often long term activity. The verifiable supporting activities indicate the start or completion of significant testing efforts. These activities should be viewed as a part of the overall continuing effort.			
FY 1998 Commence irradiation testing of advanced fuel samples at various temperatures.			
Irradiate samples to investigate fundamental corrosion processes.			
FY 1999 Complete irradiation of pressure vessel fracture toughness specimens.			
Complete irradiation of samples to investigate cracking phenomenon.			
FY 2000 Initiate irradiation of advanced fuel samples using enhanced facilities for control of sample temperatures during irradiation.			
Initiate irradiation of vendor fuel samples to demonstrate acceptability of newly established production process.			
Total, Materials Development & Verification	115,000	119,500	124,800

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ I.A Increase in core and reactor structural materials reflects increased emphasis required to support resolution of emergent issues arising from recently identified performance findings, as well as increased testing to support qualification for extended lifetime	+3,300
■ I.B. Decrease reflects reduced efforts on destructive examination and testing of components removed from operating plants and reduced effort to develop lower cost manufacturing methods	-1,000
■ I.C. Irradiations testing increases reflect development of improved testing capabilities needed to conduct on-line monitoring of radiation effects. This capability will facilitate improved material performance data and understanding of effects, and will permit faster access to data. Improved capability is necessary to support qualification and validation of material performance for longer life. Also reflects increased cost of irradiations testing in the Advanced Test Reactor	+3,000
Total Funding Change, Materials Development & Verification	+5,300

Evaluation & Servicing

Mission Supporting Goals and Objectives

Evaluation and Servicing work encompasses the operation, maintenance, and servicing of land-based prototype Naval nuclear propulsion plants and the Advanced Test Reactor, the examination of expended cores to validate end-of-life predictions, and the preservation of environmental quality at all Naval Reactors' sites.

Evaluation and Servicing supports the performance measures for ensuring the availability of prototype plants for testing and training, safely and responsibly inactivating shutdown prototype plants, supporting Navy goals for extended warship operation, and maintaining excellence in radiological and environmental control.

Keeping the prototype plants and the Advanced Test Reactor running efficiently is essential, as information obtained from testing provides valuable feedback for designing new cores and supporting operating fleet reactor plants. Testing of materials, components, cores, and systems in these reactor plants provides important technical data and experience under actual operating conditions.

The accumulation of operational data from the prototype and fleet operating plants, expended core examinations, and increases in the capability of computer modeling have enabled Naval Reactors to shut down six of the Program's eight prototype plants resulting in substantial cost savings. Work is aimed at inactivating and laying up the shutdown plants to place them in an environmentally benign state.

End-of-life fuel cell examinations and non-destructive examinations of irradiated test specimens contribute to extended warship operation by validating design predictions and providing information which can be used to improve future designs.

The Evaluation and Servicing category also funds ongoing clean up of facilities at all Naval Reactors sites to reduce hazards to personnel, and reduce potential liabilities due to changing conditions or accidental releases.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Evaluation & Servicing	166,020	163,589	149,400	-14,189	-8.7%
Total, Evaluation & Servicing	166,020	163,589	149,400	-14,189	-8.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
I. Maintain a utilization factor of at least 90% for prototype plants to ensure their availability for scheduled testing, training, and servicing needs, and provide for development of servicing equipment and testing of plant components, materials and procedures.			
A. Operate land-based test reactor plants to provide for prototypical testing, core depletion analysis, and reactor plant operator training.			
Naval Reactors operates the MARF and S8G prototypes on an around-the-clock basis to test and evaluate new/improved equipment, components, materials and operating procedures. Each prototype provides a unique testing environment. A major focus is to quickly deplete the advanced fleet reactor in S8G since the information gained will validate the predictions for the cores installed in SEAWOLF class submarines and provide data useful in the development of long lived cores. The MARF prototype is depleting the developmental materials core at varying power levels, and periodic physics tests are being performed to determine how the nuclear fuel reacts with an advanced poison material being tested in that core. These tests are conducted multiple times over the life of the core to verify predicted behaviors as the fuel depletes.			
Over the budget period, Naval Reactors will perform routine maintenance on MARF and S8G to ensure the plants remain in a safe condition and can carry out their testing mission. Other necessary work supporting safe, effective prototype operation includes: operating support systems essential for reactor plant operations; maintaining technical manuals to reflect changes in operating and test procedures; monitoring plant and equipment performance to ensure problems are promptly identified and resolved; performing routine radiological monitoring of plant operations and personnel radiation exposure; maintaining proper plant and support system chemistry control; and replacing plant components as they age to ensure continued, reliable plant operations.	31,000	31,000	32,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Meet depletion objectives for MARF and S8G cores.

Conduct the fourth MARF high power physics test and issue report.

FY 1999 Meet depletion goals for MARF and S8G.

Conduct the fourth MARF low power physics test and issue report.

FY 2000 Deplete the MARF and S8G cores according to depletion objectives.

Conduct the fifth MARF high power physics test and issue report.

Inspect pressurizer heater wells in MARF.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

B. Service land-based test reactor plants to ensure they continue to operate safely and efficiently, and develop equipment and procedures to provide for safe and efficient servicing of nuclear reactor plants.

Naval Reactors also performs major servicings on the prototypes to ensure continuing operability. Anticipated major servicings over FYs 98-00 focus on inspecting and cleaning the steam generators. This must be done periodically as solid particles settle out of the boilerwater in the low flow areas where steam generator tubes and support plates meet. These particles form a sludge, which, if not removed, could cause chemical corrosion in the metal tubes and supporting plates. Performing these inspections and cleanings on prototype plants not only keeps them operating efficiently and safely, but increases our knowledge of how fast sludge is accumulating and how corrosion is occurring in shipboard steam generators.

Naval Reactors ensures the feasibility of defueling and refueling operations is taken into consideration as part of design and development of new reactor cores. Efforts in this area currently are focused on the next generation reactor and a future aircraft carrier plant. Specifically, Naval Reactors is evaluating the next generation reactor design to ensure provision for reactor maintenance and defueling capability. Included in this effort is the design of all power unit loading, maintenance, and defueling equipment, and preparation of planning documents and analyses required for shipment and installation of the next generation reactor power unit and shipment and disposal of recoverable irradiated fuel and irradiated core components. Naval Reactors also is looking into reactor servicing concepts for a new aircraft carrier. 5,000 14,000 14,000

Verifiable Supporting Activities:

FY 1999 Inspect the two MARF steam generators.

Perform qualification testing on next generation reactor control drive mechanism seal welding machines.

Complete development of next generation reactor defueling procedures.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
FY 2000 Inspect one steam generator and clean both steam generators in S8G.			
Perform scoping studies to evaluate preliminary core and reactor servicing equipment design concepts for a new aircraft carrier.			
C. Operate and service the Advanced Test Reactor to provide for materials irradiations testing.			
As the principal customer of the Advanced Test Reactor (ATR), Naval Reactors funds operation and maintenance of the reactor to support material irradiation testing. This is the only facility in the Nation capable of performing these tests. The ATR provides the ability to irradiate five train-type experiments with various flux conditions in pressurized water loops at the same time. Actual testing is funded in the Materials Development and Verification category.			
The ATR is the main source of test data on the performance of reactor fuel, poison, and structural materials under irradiated conditions. The irradiation test program supports operating Naval reactor plants, supports material selections made for the VIRGINIA class reactor plant, and supports database development that positions Naval Reactors to better understand emergent problems with existing reactors and to make informed material selections for new reactor designs.	15,000	16,000	17,000
Verifiable Supporting Activities:			
All Years Meet operating efficiency goals.			
II. Meet cost and schedule goals to safely and responsibly inactivate shutdown land-based reactor plants in support of the Department's environmental clean-up goals.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
A. Continue inactivation efforts at the Windsor site in Connecticut to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.			
The S1C plant is defueled and significant progress has been made on dismantlement. In 1996 an Environmental Impact Statement and Record of Decision recommending prompt dismantlement of the S1C reactor compartment were issued. Work to date has resulted in approximately 26 buildings/structures being demolished and disposal of over 9,000 tons of construction debris, over 1,000 tons of recycled steel, over 6,000 tons of PCB and asbestos contaminated waste, and 1100 cubic yards of radiological waste. The major remaining work efforts at this site center around reactor compartment dismantlement.	25,020	22,000	7,000

Verifiable Supporting Activities

FY 1998	Separate the S1C reactor pressure vessel from its supporting structures and package for disposal.
	Separate, package, and ship the steam generators and reactor coolant pumps.
FY 1999	Complete primary shield tank removal, package, and ship out for disposal.
	Complete reactor compartment removal and disposal activities.
FY 2000	Complete building demolition.

B. Continue inactivation efforts at the Kesselring site in New York to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.			
The S3G and D1G plants at the Kesselring site in New York are defueled. The S3G engine room has been completely dismantled. In 1997, an Environmental Impact Statement and Record of Decision recommending prompt dismantlement of the S3G and D1G reactor compartments were issued.	20,000	14,000	19,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Complete D1G reactor compartment asbestos removal.

Complete servicing equipment disposal from D1G defueling.

FY 1999 Continue dismantlement activities, including preparations for S3G pressure vessel removal.

FY 2000 Continue inactivation efforts, including completion of S3G pressure vessel removal.

C. Continue inactivation efforts in Idaho to eliminate surplus facilities, remediate and dismantle plant facilities and release applicable areas.

Work continues on the S1W, A1W, and S5G plants at the NRF site in Idaho. Defueling of the S5G plant will complete in FY 1998. The A1W plant has two reactors, one of which is defueled. Preparatory work is underway on the other reactor with defueling scheduled in FY 1999. Naval Reactors also will perform minimal site environmental remediation to support the spent fuel agreement with the State of Idaho..... 31,000 25,589 17,000

Verifiable Supporting Activities:

FY 1998 Complete S5G defueling.

Complete servicing equipment disposal from A1W-B defueling.

FY 1999 Complete servicing equipment disposal from S5G defueling.

Complete the lay-up work for the S5G plant.

Defuel the A1W-A plant.

Decontaminate the S1W retention basin

		(dollars in thousands)		
		FY 1998	FY 1999	FY 2000
FY 2000	Complete servicing equipment disposal from A1W-A defueling.			
	Complete the lay-up work for the A1W plant.			
	Continue environmental remediation efforts stipulated in the spent fuel agreement with the State of Idaho.			
III. Ensure no personnel exceed Federal limits for radiation exposure and no significant findings result from environmental inspections by state and federal regulators.				
A. Conduct ongoing clean up of test facilities to reduce hazards to personnel, and reduce potential liabilities due to changing conditions or accidental releases.				
Operation of test, examination, and manufacturing facilities has involved the use of hazardous materials. Decontamination and remediation efforts limit the hazards to personnel, reduce the potential environmental liabilities due to changing conditions or accidental releases, and provide more usable space for future operations. These efforts reduce the current and future hazards from materials such as asbestos, heavy metals, chemicals, and radioactivity.				
The facilities are first characterized to determine the extent and nature of clean up needed. The results of these characterizations are analyzed and the efforts are prioritized based on regulatory requirements and resources available to perform the work. As such, the order in which the following verifiable supporting activities are performed is subject to change based on this prioritization process. The activities identified are, however, representative.		25,000	25,000	25,000

(dollars in thousands)		
FY 1998	FY 1999	FY 2000

Verifiable Supporting Activities:

FY 1998 Conduct asbestos abatement actions at the Naval Reactors Facility (NRF) site.

Renovate the radioactive materials laboratory at the Knolls site.

Release the NRF #2 Spray Pond for non-radiological demolition.

Decontaminate floor space in the N-building and various rooms in the CX building at the Bettis Pittsburgh site.

FY 1999 Process for disposal historical waste from the L-Building at the Bettis Pittsburgh site.

Remove asbestos from various buildings and laboratories at the Bettis Pittsburgh site.

Continue Knolls site remediation activities.

FY 2000 Initiate remediation of obsolete fuel processing facility at the Bettis Pittsburgh site.

Conduct remediation activities at Bettis Pittsburgh for disposition of historically contaminated facilities and equipment.

Continue the renovation of various areas at the Knolls site.

Continue remediation efforts at NRF in support of CERCLA and voluntary consent order requirements.

IV. Conduct planned development, testing, examination and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods to ensure Naval nuclear reactors are able to meet Navy goals for extended warship operation.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
A. Examine removed fuel cells at end-of-life and perform non-destructive examinations of irradiated test specimens to confirm predicted performance and validate design methods.			
Data obtained from the examinations of in-service components and specimens provides valuable information on material and component characteristics and performance in the harsh reactor environment. The results of examinations are used to reduce uncertainties in behavior of cores and components, to produce improvements in existing ship performance, and to extend reliable operational life. Predictive and analytical tools are updated based on differences between calculations and observed performance.	14,000	16,000	18,000

Verifiable Supporting Activities:

FY 1998 Prepare the necessary procedures and schedules for examinations, assembly, shipment, receipt, and disassembly of about fifteen irradiation tests each year.

Begin A4W prototype expended core component examinations.

Begin D2W prototype expended core component examinations.

FY 1999 Prepare the necessary procedures and schedules for examinations, assembly, shipment, receipt, and disassembly of about fifteen irradiation tests each year.

Complete data collection for highest priority A4W prototype expended core component examination.

Receive ASNPP fuel from the A1W prototype.

		(dollars in thousands)		
		FY 1998	FY 1999	FY 2000
FY 2000	Prepare the necessary procedures and schedules for examinations, assembly, shipment, receipt, and disassembly of about fifteen irradiation tests each year.			
	Complete data collection for highest priority D2W prototype expended core component examinations.			
Total, Evaluation and Servicing		166,020	163,589	149,400

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ I.A. Increases for inflation	+ 1,000
■ I.C Increases for inflation	+ 1,000
■ II.A Inactivation decreases as Windsor site inactivation nears completion	- 15,000
■ II.B Increase reflects effort at Kesselring site to remove S3G pressure vessel	+ 5,400
■ II.C Decrease reflects constrained inactivation effort at Naval Reactors Facility	- 8,589
■ IV.A Increases to reduce backlog of core exams and waste and container unloading	+ 2,000
Total Funding Change, Evaluation & Servicing	- 14,189

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	9,000	9,000	9,000	0	0.0%
Capital Equipment	41,000	42,100	39,000	-3,100	-7.4%
Total, Capital Operating Expense	50,000	51,100	48,000	-3,100	-6.1%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
90-N-102 Expended Core Facility Dry Cell	86,846	47,146	3,100	5,800	12,000	18,800
95-D-200 Laboratory Systems and Hot Cell Upgrades	19,600	18,500	1,100	0	0	0
97-D-201 Secondary Coolant System Refurbishment	5,000	400	4,600	0	0	0
98-D-200 Site Laboratory/Facility Upgrade	15,700	0	5,700	7,000	3,000	0
Total, Construction		66,046	14,500	12,800	15,000	18,800

Major Items of Equipment (TEC $2 million or greater)

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
ATR-ECF Transfer Casks ...	9,100	7,000	1,100	1,000	0	FY 2000
Corrosion/Chemistry Test Equipment Upgrade	5,400	4,700	700	0	0	FY 1999
Thermal-Hydraulic Test Equipment	2,900	100	200	1,100	1,500	FY 2001
Component Performance Test Facility Upgrade	2,100	800	1,300	0	0	FY 1999
Test Facility Upgrades	5,700	0	5,000	700	0	FY 1999
Scalable Parallel Computers .	12,000	0	12,000	0	0	FY 1998
Local Area Network Replacement	4,900	0	500	1,000	900	FY 2002
Scalable Parallel Upgrade ...	12,000	0	0	12,000	0	FY 1999
Metal Processing Equipment .	4,200	0	0	2,500	1,700	FY 2000
Post-Irradiations Evaluation Laboratory	7,400	1,400	3,000	3,000	0	FY 1999
Next Generation Scalable Computer	10,000	0	0	0	10,000	FY 2000
Total, Major Items of Equipment		14,000	23,800	21,300	14,100	

Program Direction

Mission Supporting Goals and Objectives

Due to the critical nature of nuclear reactor work, Naval Reactors is a centrally managed organization. This places a heavy burden on the Federal employees who oversee and set policies/procedures for developing new reactor plants, operating existing nuclear plants, facilities supporting these plants, contractors, and the Bettis and Knolls Atomic Power Laboratories. In addition these employees interface with other DOE offices and local, state, and Federal regulatory agencies. Ten FTE's at the Idaho Operations Office oversee operation of the advanced test reactor, which Naval Reactors uses for materials irradiation and testing. Program direction has been grouped into four categories:

Salaries and Benefits provides for Federal personnel compensation, including awards, lump sum leave payments, and employer contribution to employees' benefits.

Travel includes necessary trips to our various sites to carry out the mission of the Naval Reactors Program.

Support Services are not used by Naval Reactors.

Other Related Expenses include training, building occupancy, telecommunications, postage, payroll processing, ADP maintenance, and other miscellaneous expenses associated with the Working Capital Fund, and Program operation.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salary and Benefits	7,375	7,010	7,180	+170	+2.4%
Travel	490	500	510	+10	+2.0%
Support Services	0	0	0	0	0%
Other Related Expenses	635	650	670	+20	+3.1%
Total, Headquarters	8,500	8,160	8,360	+200	+2.5%
Full Time Equivalents	55	57	57	0	0%
Pittsburgh Naval Reactors					
Salary and Benefits	5,075	5,160	5,280	+120	+2.3%
Travel	100	150	110	-40	-26.7%
Support Services	0	0	0	0	0%
Other Related Expenses	605	515	600	+85	+16.5%
Total, Pittsburgh Naval Reactors	5,780	5,825	5,990	+165	+2.8%
Full Time Equivalents	67	72	70	-2	-2.8%
Schenectady Naval Reactors					
Salary and Benefits	4,340	4,595	4,700	+105	+2.3%
Travel	80	85	90	+5	+5.9%
Support Services	0	0	0	0	0%
Other Related Expenses	480	510	520	+10	+2.0%
Total, Schenectady Naval Reactors	4,900	5,190	5,310	+120	$2.3%
Full Time Equivalents	64	65	64	-1	-1.5%
Idaho Operations Office					
Salary and Benefits	800	820	840	+20	+2.4%
Travel	30	30	30	0	0%
Support Services	0	0	0	0	0%
Other Related Expenses	70	75	70	-5	-6.7%
Total, Idaho Operations Office	900	925	940	+15	+1.6%
Full Time Equivalents	9	10	10	0	0%
Total Naval Reactors Program					
Salary and Benefits	17,590	17,585	18,000	+415	+2.4%
Travel	700	765	740	-25	-3.3%
Support Services	0	0	0	0	0%
Other Related Expenses	1,790	1,750	1,860	+110	+6.3%
Total, Program Direction	20,080	20,100	20,600	+500	+2.5%
Full Time Equivalents	195	204	201	-3	-1.5%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Federal Staff continue to direct technical work, provide management/oversight of laboratories and facilities to ensure safe and reliable operation of Naval nuclear plants and the advanced test reactor. Staffing decreases are in accordance with Departmental staffing agreements	17,590	17,585	18,000
Travel			
FY 2000 funding supports trips required to provide management and oversight of the Naval Reactors Program	700	765	740
Support Services			
Naval Reactors does not utilize Support Services contracts	0	0	0
Other Related Expenses			
Include provision for Working Capital funds, which were predominantly budgeted for by the Office of Nuclear Energy in FY 1997. Funding also supports training, and ADP maintenance	1,790	1,750	1,860
Total, Program Direction	20,080	20,100	20,600

Explanation of Funding Changes FY 1999 to FY 2000

	FY00 vs. FY99 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits is due to salary adjustments in accordance with allowable inflation	+415
Travel	
■ Decrease in travel is due to a reduction in Program travel requirements partially offset by allowable inflation.	-25
Other Related Expenses	
■ Increase in other related expenses is primarily due to requirements for non-capital ADP procurements, projected Working Capital Fund estimates from Human resources and allowable inflation.	+110
Total Funding Change, Naval Reactors Program Direction	+500

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	115	115	116	+1	+0.9%
Working Capital Fund	502	511	542	+31	+6.1%
Printing and Reproduction	10	11	11	0	0%
Rental Space	0	0	0	0	0%
Software Procurement/Maintenance Activities/ Capital Acquisitions	393	382	458	+76	19.9%
Other	770	731	733	+2	0.3%
Subtotal, Other Related Expenses	1,790	1,750	1,860	+110	+6.3%
Use of Prior Year Balances	0	0	0	0	0%
Total, Budget Authority	1,790	1,750	1,860	+110	6.3%

90-N-102, Expended Core Facility Dry Cell, Naval Reactors Facility, Idaho

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

Total Estimated Cost and Total Project Cost have been increased by $1,900,000 for design and facility modifications in anticipation of using a larger spent fuel cask within the Dry Cell to accommodate longer fuel modules than are currently used.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1990 Budget Request (*Preliminary Estimate*)	1Q 1990	3Q 1991	3Q 1991	4Q 1995	48,000	49,936
FY 1996 Budget Request[a]	1Q 1990	4Q 1991	2Q 1993	4Q 1998	48,646	51,027
FY 1998 Budget Request[b]	1Q 1990	2Q 1999	2Q 1993	4Q 2001	62,046	79,604
FY 1999 Budget Request[c]	1Q 1990	2Q 2000	2Q 1993	4Q 2002	84,946	96,117
FY 2000 Budget Request[d] (*Title I Baseline*)	1Q 1990	2Q 2000	2Q 1993	4Q 2002	86,846	98,694

[a] This budget request reflects changes due to a June 1993 Court Injunction which placed the Dry Cell Project on hold, until an agreement was reached between the Department of Energy and State of Idaho in October, 1995.

[b] This budget request added the East End Modification to accommodate Dry Fuel Storage. (Therefore, includes preliminary estimate for East End Modification)

[c] This budget request added the West End Modification to accommodate return of spent fuel from the Idaho Chemical Processing Plant to the Expended Core Facility. (Therefore, includes preliminary estimate for West End Modification)

[d] This budget request includes additional funding to perform design and facility modifications to accommodate the potential use of a larger fuel module within the Dry Cell. In addition, the Title I design for the East End Modification has been completed.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1990	3,546	3,546	1,564
1991	4,000	4,000	3,129
1992	15,000	15,000	4,238
1993	13,600	13,600	10,078
1994	0	0	2,410
1995	0	0	555
1996	3,000	3,000	7,557
1997	8,000	8,000	13,908
1998	3,100	3,100	5,878
1999	5,800	5,800	3,538
2000	12,000	12,000	13,070
2001	13,400	13,400	8,651
2002	5,400	5,400	12,868

3. Project Description, Justification and Scope

The Expended Core Facility (ECF) Dry Cell Project will consist of a dry shielded fuel handling, disassembly, examination and loading facility, a decontamination shop, and a shielded repair shop, equipment to load spent fuel in dry storage containers, an area for overpack assembly, and an interim storage pad. Two dry storage container loading stations will be constructed, one at the east end and one at the west end of the shielded cell. The shielded facility and shops will be located in the existing ECF building South Bay and will be connected to the existing ECF water pits. The west end loading station, a fuel receipt transfer bay, spares storage, control room, and a mockup training area will be included as an approximately 22,300 square foot addition to the east and south of the existing 215,000 square foot ECF building. The addition will be of concrete and steel construction, steel reinforced concrete floor, and metal deck roof with a built-up elastomeric covering. A temporary shield wall will be constructed at the west end of the repair cell to provide for expansion of the shielded cell for the west end dry loading station in parallel with fuel handling operations in the east end loading station.

The dry shielded facility design will incorporate high density concrete radiation shielding and highly filtered air ventilation for radiological contamination control. Shielded lead glass windows and viewing aids will be provided at the various stations. The facility will include automated equipment for fuel module disassembly, examination, and interim dry storage. Features of the production line include the water pit to dry cell delivery system, the examination system, the cutting system for separation of modules, and the prepared fuel loading station. The dry (unmoderated) environment of the shielded cell allows efficient material handling with a high degree of safety. The dry cell and interim storage pad will have a design life of 40 years.

The Dry Cell Project consists of three separate tasks: the Dry Cell task; the East End Modification task; and the West End Modification task.

The Dry Cell task provides work areas and equipment needed to more efficiently handle expended nuclear cores. Existing ECF underwater equipment was not capable of handling the larger and heavier modules now received at ECF. These underwater fuel disposal methods are personnel intensive and have significant technical disadvantages. These technical disadvantages include extremely difficult equipment and facility maintenance; poor visibility; time-consuming shipping cask loading; and a significant burden of deliberately redundant administrative and physical controls for nuclear safety. The use of a dry cell significantly reduces these disadvantages. This task is approximately 99 percent complete.

The East End Modification task provides facilities and equipment for loading dry storage containers. An interim storage pad will be provided for in-process handling, staging, and interim storage of naval spent nuclear fuel. Adjacent to the interim storage pad, an area for assembly of overpacks will be constructed. The overpack assembly area and interim storage pad will add an additional 35,000 square foot structure separate from the existing ECF building. This task is approximately 13 percent complete. The TPC for the East End Modification increased by $677,000 due to the procurement of additional weld mockups for the East End Modification checkout.

The West End Modification task is for the design and fabrication of the equipment to handle the spent fuel and container components and design and construction of a second loading station and support systems. The West End Modification task will provide an approximately 60 foot extension to the Dry Cell shielded cell, a cask transfer pit below the west extension, and a building addition.

The TEC and TPC for the West End Modification increases by $1,900,000 to incorporate increased crane capacity and height, increased shielded cell height, and increased transfer pit depth to provide the flexibility necessary to handle future spent fuel components which may be longer than those currently handled at ECF.

A two loading Station arrangement will allow for processing fuel returned from INTEC in the West End Loading Station while concurrently processing spent fuel received directly from the fleet for dry storage in the east loading station. The increased capacity of the overall Dry Cell operations will facilitate a more rapid return of spent fuel from INTEC (8 versus 13 years). In addition, the arrangement allows future packaging of special case waste through one of the loading stations without interruption of dry storage container loading.

The project is scheduled to complete in September 2002. Through FY 2000, 79% of the project is expected to be completed.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	12,830	12,830
Design Management costs (2.8 % of TEC)	2,415	2,415
Project Management costs (2.6 % of TEC)	2,290	2,290
Total, Engineering design, inspection, and administration of construction costs (20% of TEC)	17,535	17,535
Construction Phase		
Buildings	35,540	30,344
Special Equipment	11,080	12,620
Standard Equipment	5,927	5,927
Inspection, design and project liaison, testing, checkout and acceptance	9,474	9,474
Project Management (2.6 % of TEC)	2,290	2,290
Total, Construction Costs	64,311	60,655
Contingencies		
Design Phase (0.6 % of TEC)	500	500
Construction Phase (5.2 % of TEC)	4,500	6,256
Total, Contingencies (5.8 % of TEC)	5,000	6,756
Total Line Item Cost	86,846	84,946
Less: Non-Agency Contribution	0	0
Total, line item costs	86,846	84,946

The cost estimate is based on the Dry Cell task being 99 percent complete, the East End Modification task Title I design being completed and the west End Modification task conceptual design being completed.

5. Method of Performance

Contracting arrangements are as follows:

a. Construction design will be performed under an Engineering Services Subcontract. Equipment will be designed by the operating contractor.

b. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bidding.

c. Title III Inspection: By Engineering Services Subcontractor under operating contractor surveillance.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility Cost						
Design	10,718	1,206	3,258	2,374	479	18,035
Construction	32,721	4,354	0	10,696	21,040	68,811
Total, Line item TEC	43,439	5,560	3,258	13,070	21,519	86,846
Operating expense funded equipment	50	380	200	3,375	462	4,467
Total Facility Costs (Federal and Non-Federal)	43,489	5,940	3,458	16,445	21,981	91,313
Other project costs						
Conceptual design cost	1,500	200	0	0	0	1,700
Decontamination and Decommissioning	0	250	500	250	100	1,100
NEPA Documentation Costs	2,500	0	0	0	0	2,500
Other project-related[a] costs	1,445	236	0	0	400	2,081
Total, Other project costs	5,445	686	500	250	500	7,381
Total Project Cost (TPC)	48,934	6,626	3,958	16,695	22,481	98,694

[a] Includes operating expense funded equipment, operating costs for decontamination and decomissioning (removal of existing structures and removal of the temporary west shield wall), preparation of environmental impact statement, and procurement of several prototype items to support equipment design and confirm system operations, for facility startup, and for operator training.

7. Related Annual Funding Requirements

	(FY 2002 dollars in thousands)	
	Current Estimate	Previous Estimate
Facility operating costs[a]	4,227	4,227
Utility costs[b]	539	539
Total related annual funding	4,766	4,766
Total operating costs (operating from FY 2002 through FY 2042)	190,640	190,640

[a] Includes personnel, materials, and capital equipment costs for operation, maintenance, and repair

[b] Includes electrical power, steam heat, and maintenance items such as utility lines, valves, and pumps.

98-D-200, Site Laboratory and Facilities Upgrade, Various Locations

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	1Q 1998	4Q 1998	1Q 1999	4Q 2001	15,700	18,660
FY 1999 Budget Request	1Q 1998	1Q 1999	2Q 1999	4Q 2001	5,900	9,860
FY 2000 Budget Request *(Title I Baseline)*	1Q 1998	1Q 1999	2Q 1999	4Q 2001	15,700	19,860

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1998	5,700	5,700	1,184
1999	7,000	7,000	6,421
2000	3,000	3,000	6,730
2001	0	0	1,365

3. Project Description, Justification and Scope

The Site Laboratory and Facilities Upgrade project will upgrade various support systems and facilities at the Bettis Atomic Laboratory in West Mifflin, PA and the Knolls Atomic Power Laboratory in Schenectady, NY. The following are the principal areas.

Upgrading materials and chemistry facilities at both laboratories to develop, test, and evaluate high temperature advanced metals, metal and ceramic alloys; analyze and certify the quality of nuclear fuel; and improve radioactive specimen preparation and examination work.

At the Knolls Site existing space will be upgraded to include new energy efficient lighting, new heating, ventilation, and air conditioning systems, and energy efficient windows. A shielded sample storage area, containments and hoods, glove boxes, and a transmission electron microscope will be installed for preparation of radioactive test samples. Examination of these samples is needed to support core and structural materials work. An inductively coupled plasma mass spectrometer will be installed to determine trace element composition at levels 10 to 50 times lower than present capability.

At the Bettis site about 5,000 square feet of existing space will be upgraded to include installation of new heating, ventilation and air conditioning equipment, high efficiency/alternating current melting furnaces for high temperature alloy fabrication, powder metallurgy equipment for fabrication of ceramic and metallic materials, and materials evaluation equipment for analyzing the mechanical, chemical, and material properties of the developed materials.

Replacing the main outdoor substation at the Bettis laboratory which is approaching 50 years of age. The normal useful life for a substation is 30 years. Replacement is necessary to maintain a reliable source of electrical power distribution at the site. Also, projected increased power demands to support development and testing programs require an increase in the load capacity of the substation.

The Bettis-Pittsburgh site distributes all electrical power received from the local utility company through the existing main outdoor substation which consists of four 23,000 volt transformers, three 23,000 volt circuit breakers, aerial switches and lightning protectors, and 13,200 volt switchgear. The upgraded main outdoor substation will replace the existing transformers and breakers with 138,000 volt equipment and provide modern 13,200 volt switchgear that uses vacuum breaker technology. Land improvements include grading of a 34,000 square foot plot of ground, installation of fencing and structural supports, and installation of a 200 foot access road.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications)	794	730
Design Management costs (1% of TEC)	252	105
Project Management costs	31	20
Total, Engineering design, inspection, and administration of construction costs (6.9% of TEC)	1,077	855
Construction Phase	0	0
Improvements to Land	0	0
Buildings	4,699	4,617
Special Equipment	0	0
Other Structures	0	0
Utilities	2,953	3,191
Standard Equipment	4,543	4,180
Major computer items	0	0
Removal less salvage	95	80
Inspection, design, and project liaison, testing, checkout and acceptance	386	178
Construction Management	382	382
Project Management	64	419
Total, Construction Costs	13,122	13,047
Contingencies		
Design Phase (0.1% of TEC)	10	52
Construction Phase (9.5% of TEC)	1,491	1,746
Total, Contingencies (9.6% of TEC)	1,501	1,798
Total Line Item Cost	15,700	15,700
Less: Non-Agency Contribution	0	0
Total, line item costs	15,700	15,700

5. Method of Performance

Contracting arrangements are as follows:

a. Construction design will be performed under an Engineering Services Subcontract. Equipment will be designed by the operating contractor.

b. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bidding.

c. Title III Inspection: By operating contractor surveillance supported as required by the Engineering Services subcontractor.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility Cost						
Design	0	985	92	10	0	1,087
Construction	0	246	7,802	6,565	0	14,613
Total, Line item TEC	0	1,231	7,894	6,575	0	15,700
Plant, Engineering, and Design (PE&D)	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
Total Facility Costs (Federal and Non-Federal)	0	1,231	7,894	6,575	0	15,700
Other project costs						
R&D necessary to complete construction	0	0	0	0	0	0
Conceptual design cost	260	0	0	0	0	260
NEPA Documentation Costs	0	0	0	0	0	0
Other ES&H costs	0	0	0	0	0	0
Other project-related[a] costs	500	1,200	1,900	300	0	3,900
Total, Other project costs	760	1,200	1,900	300	0	4,160
Total, Project cost	760	2,431	9,794	6,875	0	19,860
Less: Non-Agency Contribution	0	0	0	0	0	0
Total Project Cost (TPC)	760	2,431	9,794	6,875	0	19,860

[a] Includes operating costs for decontamination and decomissioning.

7. Related Annual Funding Requirements

	(FY 2001 dollars in thousands)	
	Current Estimate	Previous Estimate
Facility operating costs[a]	1,100	1,100
Utility costs[b]	380	380
Total related annual funding	1,480	1,480
Total operating costs (operating from FY 2001 through FY 2032)	47,360	47,360

[a] Includes personnel, materials, and capital equipment costs for operation, maintenance, and repair

[b] Based on current usage projection.

DOE/CR-0061
Volume 2

Department of Energy
FY 2000 Congressional Budget Request

Energy Supply

February 1999

Office of the Chief Financial Officer

Volume 2

(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy and Water Development Appropriations					
Energy supply	758,899	770,053	841,888	71,835	9.3%
Uranium supply & enrichment activities	—	—	—	—	—
Non-defense environmental management	463,454	431,200	330,934	-100,266	-23.3%
Uranium enrichment D&D fund	230,200	220,200	240,198	19,998	9.1%
Science	2,483,573	2,697,860	2,835,393	137,533	5.1%
Departmental administration	133,280	111,572	123,490	11,918	10.7%
Office of the inspector general	27,500	29,000	30,000	1,000	3.4%
Atomic energy defense activities:					
Weapons activities	4,146,692	4,400,000	4,531,000	131,000	3.0%
Defense environmental restoration & waste management	4,319,575	4,320,567	4,505,676	185,109	4.3%
Defense facilities closure projects	995,885	1,041,740	1,054,492	12,752	1.2%
Environmental management privatization	200,000	228,357	228,000	-357	-0.2%
Other defense activities	1,702,178	2,201,087	1,792,000	-409,087	-18.6%
Defense nuclear waste disposal	190,000	189,000	73,000	-116,000	-61.4%
Total, Atomic energy defense activities	11,554,330	12,380,751	12,184,168	-196,583	-1.6%
Power marketing administrations	243,619	237,510	199,947	-37,563	-15.8%
Federal energy regulatory commission	—	—	—	—	—
Nuclear waste disposal	156,000	169,000	297,000	128,000	75.7%
Geothermal resources development fund	—	—	-821	-821	—
Total, Energy and Water Development Appropriations	16,050,855	17,047,146	17,082,197	35,051	0.2%

(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Interior and Related Agencies Appropriations					
Fossil energy research and development	356,517	384,056	364,000	-20,056	-5.2%
Alternative fuels production	-1,500	-1,300	-1,000	300	23.1%
Naval petroleum and oil shale reserves	107,000	14,000	——	-14,000	-100.0%
Elk Hills school lands fund	——	36,000	36,000	——	——
Energy conservation	584,354	627,701	837,515	209,814	33.4%
Economic regulation	2,725	1,801	2,000	199	11.0%
Strategic petroleum reserve	207,500	160,120	164,000	3,880	2.4%
Energy information administration	66,800	70,500	72,644	2,144	3.0%
Clean coal technology	-101,000	-40,000	-246,000	-206,000	-515.0%
Total, Interior and Related Agencies Appropriations	1,222,396	1,252,878	1,229,159	-23,719	-1.9%
Uranium enrichment D&D fund discretionary payments	-388,000	-398,088	-420,000	-21,912	-5.5%
Excess fees and recoveries, FERC	-10,159	-29,446	-28,342	1,104	3.7%
Colorado river basin	-16,098	-16,098	-21,000	-4,902	-30.5%
Total, Department of Energy	16,858,994	17,856,392	17,842,014	-14,378	-0.1%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Energy and Water Development Activities				
Energy Supply	1,536	1,629	1,331	-18.3%
Science	263	318	325	2.2%
Atomic Energy Defense Activities				
Weapons Activities	1,837	1,876	1,799	-4.1%
Environmental Restoration & Waste Mgmt	2,782	2,764	2,697	-2.4%
Other Defense Activities	846	736	964	31.0%
Total Atomic Energy Defense Activities	5,465	5,376	5,460	1.6%
Departmental Administration	1,258	1,302	1,303	0.1%
Inspector General	245	266	257	-3.4%
Power Marketing Administration	4,253	4,347	4,309	-0.9%
Federal Energy Regulatory Commission	1,318	1,320	1,320	-0.0%
Nuclear Waste Fund	202	197	196	-0.5%
Total, Energy & Water Development Activities	14,540	14,755	14,501	-1.7%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Interior and Related Agencies				
Clean Coal Technology	61	67	60	-10.4%
Fossil Energy Research & Development	660	679	681	0.3%
Naval Petroleum & Oil Shale Reserves	59	54	39	-27.8%
Energy Conservation	419	441	426	-3.4%
Economic Regulation	22	17	16	-5.9%
Strategic Petroleum Reserve	132	135	125	-7.4%
Energy Information Administration	382	378	371	-1.9%
Total, Interior & Related Agencies Activities	1,735	1,771	1,718	-3.0%
Total, Department of Energy	16,275	16,526	16,219	-1.9%

(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy Supply					
Solar and renewable resources technologies	338,655	383,905	446,021	62,116	16.2%
Nuclear energy	250,917	266,928	269,305	2,377	0.9%
Environment, safety and health	65,268	50,398	50,750	352	0.7%
Technical information management	10,100	8,600	9,100	500	5.8%
Field operations	95,000	104,127	102,000	-2,127	-2.0%
Transfer to OSHA for external reg	—	1,000	—	-1,000	-100.0%
Oak Ridge landlord	11,000	11,000	11,812	812	7.4%
AVLIS development and demonstration program	60,000	—	—	—	—
Small business innovation research (SBIR)	8,932	—	—	—	—
Subtotal, Energy Supply	839,872	825,958	888,988	63,030	7.6%
Use of prior year balances and other adjustments	-80,973	-55,905	-47,100	8,805	15.7%
Total, Energy Supply	758,899	770,053	841,888	71,835	9.3%

Energy Supply

Proposed Appropriation Language

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses necessary for energy supply, and uranium supply and enrichment activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; and the purchase of not to exceed [22] *1* passenger motor [vehicles] *vehicle* for replacement only[, $727,091,000, of which not to exceed $3,000 may be used for official reception and representation expenses for transparency activities], *$841,888,000 to remain available until September 30, 2001, of which $820,953 shall be derived by transfer from the Geothermal Resources Development Fund, and of which $5,000,000 shall be derived by transfer from the United States Enrichment Corporation Fund. (Energy and Water Development Appropriation Act, 1999.)*

[*SEC 108.* An additional amount of $60,000,000 for Department of Energy—Energy Programs, "Energy Supply", is hereby appropriated to remain available until September 30, 2000.] *(Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, Public Law 105-277, Division A, Section 108.)*

Explanation of Change

–Language provides that funding will remain available for 2 years.

–All remaining unobligated balances are transferred from the Geothermal Resources Development Fund and the account will be closed.

– $5 million is transferred from the United States Enrichment Corporation Fund for the disposition of depleted uranium hexafluoride inventory as authorized by P.L. 105-204.

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Energy Supply

Solar and Renewable Resources Technologies

Executive Budget Summary

Mission

The Energy Efficiency and Renewable Energy (EERE) program supports the Department of Energy's strategic objectives of increasing the efficiency and productivity of energy use, while limiting environmental impacts; reducing the vulnerability of the U.S. economy to disruptions in energy supplies; ensuring that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact; supporting U.S. energy, environmental, and economic interests in global markets; and delivering leading-edge technologies that are critical to the DOE mission and the nation. EERE activities funded under the Energy and Water Development Appropriation are designed to advance a broad range of renewable electric, fuel, and related storage and power delivery technologies to provide the nation with a more reliable, affordable and clean energy supply.

EERE's programs work in cost-shared partnerships with the nation's manufacturers, utilities, states, and the public to advance the development and facilitate the deployment of renewable energy technologies. By accelerating the use of renewable energy, EERE's programs help to strengthen the economy, improve the environment, and ensure a more secure future.

Strategy

The EERE strategic goals reflect the Administration's emphasis on Federal energy R&D for delivering significant benefits to the nation. In its 1997 review of the national energy R&D portfolio, the President's Committee of Advisors on Science and Technology recommended increases in a number of renewable energy R&D programs. The Committee noted that renewable technologies produce near-term and rapidly expanding public benefits, including air emissions reductions, reduced dependence on imported oil, and lower costs to households and firms. The Committee called for significant expansion of renewable energy programs in order to meet the energy challenges and opportunities of the 21st century.

EERE plays a leading role in implementing several Administration priorities. The President's Million Solar Roofs Initiative, implemented by the EERE Office of Utility Technologies, is aimed at facilitating the installation of photovoltaic and solar hot water systems on one million buildings across the nation by 2010.

Under a Distributed Generation initiative, EERE is coordinating program efforts that advance small-scale, on-site power generation as an alternative to centralized baseload power generation. Technologies for distributed generation, including photovoltaics, concentrating solar power, fuel cells, gas turbines, hydrogen production and storage, and hybrid fossil/renewable power systems, can greatly reduce both

energy use and carbon emissions. As part of these efforts, EERE has launched the Combined Heat and Power initiative to develop and deploy systems that produce both electricity and thermal energy from a single power source. Recent studies indicate that widespread use of combined heat and power could sufficiently reduce greenhouse gas emissions. Also under the Distributed Generation initiative, demonstrations of residential and building-sized hydrogen/natural gas fuel cells for off-grid applications are underway.

A transmission reliability program, launched in FY 1999, seeks to ensure an efficient, reliable power delivery system in the U.S. during the electricity industry's transition to competitive markets. This program will develop advanced technologies that will enable the lowest cost efficient power delivery systems with integration of distributed generation resources. These technologies will likely include real time controls for reliable, efficient operation of our Nation's power system under both normal and emergency conditions.

An electricity restructuring initiative, also launched in FY 1999, seeks to provide unbiased technical assessments to Federal and State officials on restructuring issues related to energy efficiency and renewable energy. These assessments assist decision makers to develop and coordinate utility restructuring legislation and regulations that include suitable policy and market mechanisms for renewable energy and energy efficiency.

During the 20th century, our nation's economy has depended heavily on imported fossil fuels. Biomass — a renewable alternative — represents a tremendous, largely untapped, domestic resource for our energy future. By investing in a bioenergy industry today, we can cultivate and harness these renewable resources to fuel our cars, power our homes and industries, and supply our chemical needs in the 21st century. The Department of Energy, along with other federal agencies and private partners, is launching a national partnership to develop an integrated industry to produce power, fuels, and chemicals from crops, trees, and wastes. By making a "ton of biomass" a viable market competitor to a barrel of oil or a railroad car of coal, this initiative will help grow the U.S. economy, strengthen U.S. energy security, protect the environment, and revitalize rural America. This effort will integrate the efforts from existing DOE R&D in biomass power, transportation biofuels and the forest products and agriculture Industries of the Future to enable technologies that produce different combinations of power, fuels, chemicals and other products from different feedstocks in different areas of the country. It is only through the integration of these efforts that biomass will be an effective competitor to imported fossil fuels.

Program Drivers - EERE's programs target Federal resources in key areas that provide critical national benefits; stimulate complementary private investments; leverage market forces; and respond to five significant drivers:

- National Security;
- Economic Competitiveness;
- Environmental Quality;
- Climate Change; and,
- Electricity Restructuring.

- **National Security** - During the past 25 years, three major disruptions in the world oil market have shaken the global economy. In 1997, U.S. net oil imports accounted for approximately 49

percent of domestic petroleum consumption. By 2020, U.S. net oil imports are expected to grow to over 70 percent of domestic petroleum consumption, with Persian Gulf nations accounting for over 64 percent of the world's oil exports. In 2020, U.S. net annual expenditures for imported crude oil and products are projected to exceed $180 billion in current dollars. Given historical precedents and future oil market trends, the United States has a critical interest in diminishing the nation's reliance on foreign oil through the use of indigenous renewable energy sources. EERE's efforts to implement a smart energy policy recognize this security concern and work to reduce U.S. dependence on foreign oil. As a related benefit, EERE's work on renewable energy reduces the U.S. trade deficit by reducing costly energy imports.

- **Economic Competitiveness** - In addition to reducing the nation's vulnerability to disruptions in energy supplies, EERE's research and development efforts advance U.S. economic interests. Carried out in partnership with industry, national laboratories, and universities, EERE's research and development programs are designed to maintain America's technological expertise and competitive advantage in the global market. A smart energy policy, as promoted by EERE's programs, strengthens the nation's economic power. EERE's investments not only lay the foundation for a more sustainable energy future but also open markets for U.S. manufacturers of advanced renewable energy technologies and related power technologies.

  EERE also sponsors international programs to promote U.S. renewable energy technologies and services in international markets, to help ensure that U.S. companies are competitive in the large and growing global marketplace. The World Bank has estimated that, over the next four decades, developing countries alone will require five million megawatts of new electrical capacity to meet the needs of their citizens and their expanding economies. (The world's total installed capacity today is three million megawatts.) This demand represents a tremendous potential for job creation and technology sales, even if renewable technologies only capture a fraction of the worldwide market.

- **Environmental Quality** - Air pollution, particularly in urban centers, ranks high among the nation's most pressing environmental concerns. In advancing a smart energy policy, EERE programs work to mitigate and minimize the environmental costs associated with energy use. Renewable technologies advanced by EERE offer a cleaner, environmentally responsible option for generating power.

- **Climate Change** - The President's FY 2000 budget request for EERE programs is a major element of his proposal to invest $6.3 billion over five years to reduce greenhouse gas emissions to below 1990 levels by 2008 - 2012 through energy technology research and development and tax incentives. In 1997, a major study conducted by five national laboratories documented the critical role that development and deployment of renewable energy technologies can play in reducing greenhouse gases. Given the cost savings associated with these technologies, the study noted that aggressive investment in energy R&D and deployment could lead to significant emissions reductions without raising the nation's energy bill.

- **Electricity Restructuring** - EERE is working with utilities, industry, states, and consumers to ensure that electricity restructuring results in a competitive and effective electric power industry. Power market restructuring presents an opportunity to reduce energy costs, advance the use of energy efficient and renewable energy technologies, and provide affordable services with reduced environmental impacts.

Major Changes

Managing for Results - Since the beginning of FY 1998, the Department has put in place a new management team for the Office of Energy Efficiency and Renewable Energy (EERE). This new team has been resolving long-standing management issues and is committed to making further improvements. Specific reforms that have been accomplished in the past year as well as new initiatives are summarized below:

- **Strategic Planning for Results and Technology Roadmaps** - Consistent with the Government Performance and Results Act, EERE is developing a new strategic plan with a focus on results. This plan builds on the technology roadmaps that the Department and the Office are developing. In addition, it will sharpen the Office's focus on procurement and business strategies that will improve the efficiency and effectiveness of operations.

- **Increasing Competition and Refining Merit Review Processes** - EERE is increasing the amount of its program funds that are awarded on a competitive basis, and this approach is expected to improve the quality of the resulting work products. In 1998, the Department competed the roughly $1 billion management and operating contract for the National Renewable Energy Laboratory, and the resulting contract strengthens the laboratory's management team and sharpens its mission focus.

  During the past year, EERE also has issued a broad-based solicitation for proposals on information dissemination and outreach activities. This solicitation involves competitive applications for approximately $13,500,000 million in work activities, much of which had been awarded on a non-competitive basis in the past. In 1998, the Office also issued a broad-based solicitation for research, development, and demonstration (RD&D) proposals and issued various targeted solicitations for proposals in specific technology areas.

  In 1998, EERE also has refined its objective merit review processes through new regulations and additional guidance and training. These reviews of proposals by independent experts are expected to assure the selection of the highest quality projects.

- **Managing Smarter** - EERE has made notable progress in reducing uncosted obligations. Since the beginning of FY 1996, we have reduced the uncosted balances in the Solar and Renewable Resources Technologies by nearly 62 percent, from a beginning balance FY 1996 of nearly $268,000,000 to an ending FY 1998 balance of approximately $102,000,000. While this represents substantial progress in addressing this Congressional concern, EERE has taken steps toward further reducing uncosted balances. We are working to accelerate the obligation and costing of funds and we are also examining other steps that can reduce these balances without compromising sound management practices. In addition, just like any good business, EERE has

focused on assuring that its workforce for the 21st Century includes adequate staff with necessary skills to manage long-term projects supported by recent budget increases.

- **Strengthening Program Integration** - Since the solutions to our energy efficiency and renewable energy challenges cross sector lines, EERE is focusing increased attention on stimulating increased integration across technologies and across their applications. Two leading efforts are the Bioenergy Initiative and the EnergySmart Schools Initiative.
- **Leveraging Federal Investments by Expanding Partnerships with Federal, State and Other Entities** - EERE is strengthening its partnerships with other government entities and the private sector to better leverage the Federal investment in RD&D and to facilitate the deployment of new technologies. These partnerships involve other components of the Department of Energy (the Offices of Fossil Energy, Nuclear Energy, and Science) and other Federal agencies. EERE also has begun an initiative with the States to establish a much closer working relationship with State organizations pursuing energy technology RD&D. EERE also works closely with national laboratories, businesses, universities, non-profit organizations, and the Congress to: set research and development priorities; conduct high-priority research; facilitate the deployment of technologies by the private sector, and disseminate information. In many cases, EERE activities are jointly funded with private sector or other public sector entities. EERE is also strengthening the role of its Regional Support Offices in delivering services at the state and local level.
- **Increasing Emphasis on Project Management** - In 1999, EERE will place an increased emphasis on strengthening systems necessary to manage effectively the cost, schedule, and performance of projects. This emphasis is increasingly important as the Offices intensifies its role in demonstration projects.
- **Emphasizing Program Evaluation and Continuous Improvement** - EERE is committed to following best business practices, which involve effective performance measurement and refinement of program strategies as new information is obtained. EERE has discontinued activities that have not met pre-determined goals and will continue to modify its strategies based on its program analysis and evaluation results.

FY 2000 Congressional Budget Request

In support of its priorities, EERE submits the following FY 2000 budget request. The table covers both the Energy and Water Development and Interior and Related Agencies Appropriations. A more detailed table for the Solar and Renewable Resources Technologies follows.

Office of Energy Efficiency and Renewable Energy

FY 2000 Congressional Budget Request

(in thousands of dollars)

	FY 1998	FY 1999	FY 2000	$ Change
Solar and Renewable Resources Technologies	294,351	336,000	398,921	62,921
Building Technology, State and Community Programs	232,702	262,221	335,881	73,660
Federal Energy Management Program	19,800	23,818	31,868	8,050
Industrial Technologies	133,911	165,859	171,000	5,141
Transportation Technologies	189,972	202,071	252,100	50,029
Policy and Management	28,925	37,732	46,666	8,934
Total Program Funding	899,661	1,027,701	1,236,436	208,735
PODRA and Prior Year Balances	-45,403	-64,000	-821	63,179
Total Budget Authority[a]	854,258	963,701	1,235,615	271,914

[a]Total Budget Authority figures take into account prior year balances and projected receipts associated with the Petroleum Overcharge Distribution and Restitution Act (PODRA).

Program Funding Detail

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	Funding Change
Solar and Renewable Resources Technologies				
Solar Building Technology Research				
Space Conditioning and Water Heating	2,625	3,600	5,500	+1,900
Photovoltaic Energy Systems				
Fundamental Research	11,000	11,000	20,309	+9,309
Advanced Materials and Devices	24,000	27,000	27,000	0
Collector Research & Systems Development	29,691	34,200	46,000	+11,800
Total, Photovoltaic Energy Systems	64,691	72,200	93,309	+21,109
Concentrating Solar Power				
Distributed Power System Development	3,550	5,300	6,700	+1,400
Dispatchable Power System Development	6,850	5,970	5,340	-630
Advanced Component and System Research	5,117	4,990	5,960	+970
Strategic Alliances & Market Awareness	800	740	850	+110
Total, Concentrating Solar Power	16,317	17,000	18,850	+1,850
Biomass/Biofuels Energy Systems				
Power Systems				
Thermochemical Conversion	1,500	1,550	2,700	+1,150
Systems Development	21,017	26,350	32,150	+5,800
ATS/Biomass for Cogeneration	2,564	0	0	0
Feedstock Development	1,723	2,300	3,100	+800
Regional Biomass Energy Program	985	1,250	1,000	-250
Total, Power Systems	27,789	31,450	38,950	+7,500
Transportation				
Ethanol Production	25,027	35,950	37,441	+1,491
Biodiesel Production	800	750	1,000	+250
Feedstock Production	2,500	2,800	5,500	+2,700
Regional Biomass Energy Program	2,000	2,250	3,500	+1,250
Integrated Bioenergy Research and Development	0	0	6,000	+6,000
Total, Transportation	30,327	41,750	53,441	+11,691
Total, Biomass/Biofuels Energy Systems	58,116	73,200	92,391	+19,191
Wind Energy Systems				
Applied Research	11,101	10,700	13,500	+2,800
Turbine Research	13,000	16,400	20,200	+3,800
Cooperative Research & Testing	8,027	7,671	11,900	+4,229
Total, Wind Energy Systems	32,128	34,771	45,600	+10,829
Renewable Energy Production Incentive Program	2,954	4,000	1,500	-2,500

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	Funding Change
Solar Program Support				
Electricity Restructuring	0	0	2,000	+2,000
Competitive Solicitation	0	0	8,000	+8,000
Total, Solar Program Support	0	0	10,000	+10,000
International Solar Energy Program	1,375	6,350	6,000	-350
National Renewable Energy Laboratory				
Facility Maintenance	1,000	3,900	1,100	-2,800
Construction	2,200	0	0	0
Total, National Renewable Energy Laboratory	3,200	3,900	1,100	-2,800
Geothermal				
Geothermal Electric R&D and Development	22,294	22,000	29,500	+7,500
Geothermal Heat Pump Deployment	6,400	6,500	0	-6,500
Total, Geothermal	28,694	28,500	29,500	+1,000
Hydrogen Research	15,806	22,250	28,000	+5,750
Hydropower	729	3,250	7,000	+3,750
Renewable Indian Energy Resources	3,939	4,779	0	-4,779
Electric Energy Systems and Storage				
Transmission Reliability				
Power System Reliability	0	2,500	3,800	+1,300
Distributed Power	0	500	200	-300
Total, Transmission Reliability	0	3,000	4,000	+1,000
High Temperature Superconducting R&D				
Superconductivity Partnership Initiative	14,000	14,500	14,000	-500
Second Generation Wire Initiative	8,000	8,000	8,000	0
Strategic Research	9,579	10,000	9,000	-1,000
Total, High Temperature Superconducting R&D	31,579	32,500	31,000	-1,500
Energy Storage Systems				
Storage Systems Integration	1,950	2,200	3,000	+800
Key Components for Storage Systems	1,350	1,400	2,100	+700
Analysis and Utility Competition	539	900	900	0
Total, Energy Storage Systems	3,839	4,500	6,000	+1,500
Climate Challenge	0	100	0	-100
Electric & Magnetic Fields R&D	7,844	0	0	0
Total, Electric Energy Systems and Storage	43,262	40,100	41,000	+900
Program Direction				
Golden Field Office	1,509	1,700	2,645	+945
Idaho Operations Office	88	90	95	+5
Headquarters	14,054	16,310	16,431	+121
Total, Program Direction	15,651	18,100	19,171	+1,071

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	Funding Change
Federal Building/Remote Power Initiative	4,864	4,000	0	-4,000
Subtotal, Solar and Renewable Resources Technologies	294,351	336,000	398,921	+62,921
Use of prior year balances	-24,447	0	-821	-821
Total, Solar and Renewable Resources Technologies	269,904	336,000	398,100	+62,100

Program Staffing

(whole FTEs)

	FY 1998	FY 1999	FY 2000	Change
Golden	18	15	15	0
Idaho	1	1	1	0
Headquarters	98	91	84	-7
Total, Solar and Renewable Resources Technologies	117	107	100	-7

Climate Change Technology Initiative (CCTI)
Departmental Crosscut

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	$ Change	% Change
Energy & Water Development					
Energy Supply					
Solar and Renewable	269,904	336,000	398,921	62,921	18.7%
Nuclear Energy	0	0	5,000	5,000	100.0%
Subtotal, Energy Supply	269,904	336,000	403,921	67,921	20.2%
Science	0	13,500	33,000	19,500	144.4%
Total, Energy & Water	269,904	349,500	436,921	87,421	25.0%
Interior and Related Agencies					
Energy Conservation R&D	450,215	525,701	646,515	120,814	23.0%
Fossil Energy R&D	0	23,890	36,776	12,886	53.9%
Energy Information Administration	0	2,500	3,000	500	20.0%
Total, Interior and Related Agencies	450,215	552,091	686,291	134,200	24.3%
Total, DOE Climate Change Technology Initative	720,119	901,591	1,123,212	221,621	24.6%

Solar and Renewable Resources Technologies

Program Mission

The mission of the Solar and Renewable Resources Technologies program is to lead the national effort to develop renewable energy technologies and to accelerate their acceptance and use, nationally and internationally. Within the Office of Energy Efficiency and Renewable Energy (EERE), the program supports research and development of clean, reliable renewable energy technologies and cutting edge power delivery technologies that will improve the performance and efficiency of electric power systems.

The Solar and Renewable Resources Technologies program contributes to national energy security, enhances U.S. economic competitiveness, and reduces the environmental impacts of energy-related activities. The program provides additional clean-power options for a restructured electricity supply industry and clean liquid biofuels for the transportation sector. The EERE Office of Power Technologies implements most of program activities, while the EERE Office of Transportation Technologies administers the transportation biofuels program.

Program Goals and Objectives

To improve the Nation's overall economic, energy security, and environmental health through the development of clean, competitive power technologies for the 21st century.

The principal strategy for the Solar and Renewable Resources Technologies program is to invest in renewable energy technologies research and development focused on core technology needs. This research and development provides the technological advances needed to develop competitive new energy systems and create the basis for industry investment in product development. Areas addressed include materials and component improvement, conversion efficiency, system integration, system control, and evaluation of component lifetime. While such fundamental research is necessary, it must be complemented with evaluation of system performance under real world conditions. Experience has shown that user acceptance and industry commercialization investment requires confidence in the day-to-day performance, operating cost, system reliability, and operating lifetime of renewable energy and power delivery technologies. The program's activities thus include prototype evaluation and system field tests where appropriate, to establish a basis for predicting operation and maintenance costs.

Since program success depends on industry's ultimate commercialization of the program's technologies under development, partnership with industry is essential. These partnerships include industry co-investment at increasing levels as technologies near the pre-commercialization stage.

Additionally, the program utilizes the talents found at the National Laboratories and within the state, university, and other research organizations across the U.S. in order to achieve its research and development objectives. This not only helps us to accomplish our R&D mission, but the States are also encouraged to share "lessons learned" through their own peer network activities. Similarly, we also partner with a number of universities across the country to conduct both fundamental and applied research. Whenever possible, we encourage our partners to provide viable prototype power technology

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systems to schools and other educational facilities so that they may continue to receive the benefits of these clean power systems once our research work is done.

Specific program objectives include:

- **To triple the installed U.S. electricity production capacity of non-hydropower renewable energy systems by 2010** – Increase capacity by 7,000 MW to 25,000 MW (base year is 1996) through advances in conversion technology and reductions in capital cost.
- **To achieve sufficient advances in high temperature superconductivity by 2010** – Advances will result in commercial introduction by industry of at least two power system devices, such as superconducting motor, generator, transformer, transmission cable or fault current limiter.
- **To achieve sufficient component and system integration improvements by 2010** – Improvements will result in commercial availability of energy storage systems for large scale power quality and solar or wind applications from at least three companies.
- **To achieve sufficient levels of biofuel ethanol technology advancement** – Advancements will establish at least three commercial plants that use agricultural and/or municipal solid wastes by 2004, and will demonstrate an industrial ethanol site that uses energy crops by 2005.

Attainment of these objectives will contribute to Departmental strategic objectives as stated in the Department of Energy Strategic Plan of September 1997. These strategic objectives are to reduce the vulnerability of the U.S. economy to disruptions in energy supplies; to ensure adequate and affordable energy supplies in a competitive marketplace while importing environmental quality; to increase the efficiency and productivity of energy use; and to support U.S. energy and economic competitiveness in global markets.

The table below reflects projected aggregated benefits to the nation resulting from the Solar and Renewable Technologies program investments in technology advancements. Primary Energy Displaced refers to fossil fuels not consumed because electricity production from renewable energy sources will have displaced them or because energy has been saved through the use of advanced system technologies.

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.10	1.50	3.60
Energy Savings ($ Billions)	0.20	1.40	5.80
Carbon Displaced Millions Metric Tons Carbon Equivalent (MMTCE)	3.00	30.00	64.00
Oil Displacement (Million of Barrels per Day)	0.00	0.17	0.48

As a comparison, estimated energy displaced in 2020 would be equal to today's electricity consumption of the five-state region comprised of Indiana, Illinois, Ohio, Michigan, and Wisconsin.

Investments in research and development of renewable energy technology are essentially investments in renewable energy reserves -- in the same sense that significant oil or coal reserves add a measure of energy security for the nation. Technological advances often make renewable energy systems economically competitive, and while these renewable technologies may not immediately enter the

marketplace, they nevertheless become national assets. Unlike fossil fuel reserves, these renewable technology reserves will not be depleted.

Performance Measures

At the level of resources proposed in this budget request, significant progress is anticipated throughout the next five-year period. Demonstrative indicators of such progress in Renewable Energy and Power Delivery Technologies will be:

FY 2001- 2006 Performance Measures

Photovoltaic Energy Systems

- Photovoltaic modules will be commercially available at approximately $4 per watt in quantity orders, as opposed to $5 per watt in 1997, a 20% decrease in cost.

Concentrating Solar Power Program

- Dispatchable concentrating solar power systems will be capable of producing power at $0.06 to $0.08KWh.

Wind Energy Systems

- Wind turbines capable of providing electricity at 2.5 cents per kilowatt-hour in good (15 mph) wind regions will be introduced commercially.

Biomass/Biofuels Energy Systems - Transportation

- A three-fold improvement from 1998 levels of cellulase enzyme activity for converting cellulosic biomass to ethanol will be demonstrated, resulting in a 200% reduction in production costs.

Geothermal

- Geothermal drill bits that provide double the life and double the penetration rate of today's drill bits will be commercially available. (Drilling typically accounts for 30% or more of geothermal project cost.)

Electric Energy Systems and Storage

- **High Temperature Superconducting** - Testing will be in progress on a 5000 horsepower superconducting motor with half the losses of a comparable motor today. (In the United States, two-thirds of today's electricity is consumed by operating motors.)
- **Energy Storage Systems** - Tests of an advanced battery storage systems requiring a projected 20% less square footage and with a 20% longer life than today's systems will be underway at a user site. (System space requirements are a critical factor in many customer evaluations, and system lifetime is a major factor in life cycle cost.)

Significant Accomplishments and Program Shifts

Photovoltaic Energy Systems

- Achieved an increase in U.S. photovoltaic module production output of 14 megawatts in 1997, in comparison to 1996 output.

Concentrating Solar Power Program

- Achieved 153 hours of continuous power generation at the Solar Two power tower, which uses molten salt as heat transfer energy source system.

Biomass/Biofuels Energy Systems - Biopower Systems

- Completed operational testing of the Vermont indirect biomass gasifier and produced clean biogas.
- Completed engineering design for Minnesota Gasification Project for a power plant for gasification of alfalfa stems.

Biomass/Biopower Energy Systems

- **Transportation** - Established partnership with the timber industry, United States Forest Service, and local communities to evaluate environmental effects of forest watershed management when forest thinnings are created to suppress potential forest fires and used to produce ethanol, electricity, and bio-products.

Wind Energy Systems

- Established the National Wind Technology Center as accepted site for collection of wind turbine certification data.

Geothermal

- Attracted over 200 utilities to participate in the geothermal heat pump consortium.

Hydropower

- Completed conceptual design for advanced "fish friendly" hydroturbine.

Electric Energy Systems and Storage

- **Transmission Reliability** - Completed Technology Characterizations for all Office of Power Technologies programs, in cooperation with the Electric Power Research Institute (EPRI), and identified specific advancements needed for each technology to reach program goals.
- **High Temperature Superconducting** - Achieved high temperature superconductor with current carrying capability of 1,000,000 amperes per square centimeter in laboratory tests, over 1,000 times more capacity than copper wire.
- **Energy Storage Systems** - Completed assembly of storage program's first transportable battery energy storage system (TBESS); installed TBESS at utility customer site for evaluation.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Solar and Renewable Resources Technologies					
Solar Building Technology Research	2,625	2,900	700	3,600	5,500
Photovoltaic Energy Systems	64,691	66,800	5,400	72,200	93,309
Concentrating Solar Power	16,317	17,000	0	17,000	18,850
Biomass/Biofuels Energy Systems	58,116	72,750	450	73,200	92,391
Wind Energy Systems	32,128	33,200	1,571	34,771	45,600
Renewable Energy Production Incentive Program	2,954	4,000	0	4,000	1,500
Solar Program Support	0	0	0	0	10,000
International Solar Energy Program	1,375	3,750	2,600	6,350	6,000
National Renewable Energy Laboratory	3,200	2,000	1,900	3,900	1,100
Geothermal	28,694	28,500	0	28,500	29,500
Hydrogen Research.	15,806	21,000	1,250	22,250	28,000
Hydropower	729	2,000	1,250	3,250	7,000
Renewable Indian Energy Resources	3,939	3,500	1,279	4,779	0
Electric Energy Systems and Storage	43,262	39,500	600	40,100	41,000
Program Direction	15,651	17,100	1,000	18,100	19,171
Federal Building/Remote Power Initiative	4,864	4,000	0	4,000	0
Subtotal, Solar and Renewable Resources Technologies	294,351	318,000	18,000	336,000	398,921
Use of prior year balances	-24,447	-42,000[a]	42,000[b]	0	-821[c]
Total, Solar and Renewable Resources Technologies	269,904	276,000	60,000	336,000	398,100

[a]Share of EWD reduction for use of prior-year balances assigned to this program.

[b]Reflects spread of $60,000,000 provided in the Omnibus Consolidated Apprpriation Act.

[c]Reflects an appropriation transfer from the Geothermal Resources Development Fund.

Public Law Authorization:

P.L. 94-163, "Energy Policy and Conservation Act" (ECPA) (1975)

P.L. 94-385, "Energy Conservation and Product Act" (ECPA) (1976)

P.L. 95-91, "Department of Energy Organization Act" (1997)

P.L. 95-618, "Energy Tax Act of 1978"

P.L. 95-619, "National Energy Conservation Policy Act" (NECPA) (1978)

P.L. 95-620, "Powerplant and Industrial fuel Use Act of 1978"

P.L. 96-294, "Energy Security Act" (1980)

P.L. 100-12, "National Appliance Energy Conservation Act of 1987"

P.L. 100-615, "Federal Energy Management Improvement Act of 1988"

P.L. 101-218, "Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989"

P.L. 101-549, "Clean Air Act Amendments of 1990"

P.L. 101-575, "Solar, Wind, Waste, and Geothermal Power Production Incentives Act of 1990"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	640	1,345	1,350	+5	0.4%
Atlanta Regional Support Office	272	805	1,205	+400	+49.7%
Boston Regional Support Office	1,330	1,650	1,875	+225	+13.6%
Chicago Regional Support Office	715	740	1,170	+430	+58.1%
Denver Regional Support Office	2,534	1,180	1,590	+410	+34.7%
Philadelphia Regional Support Office	2	203	203	0	0.0%
Seattle Regional Support Office	730	1,170	1,315	+145	+12.4%
Los Alamos National Laboratory	5,300	5,700	6,025	+325	+5.7%
Sandia National Laboratory	32,568	37,664	47,856	+10,192	+27.1%
National Renewable Energy Laboratory	95,954	116,973	126,624	+9,651	+8.3%
Golden Field Office	43,451	61,288	64,247	+2,959	+4.8%
Total, Albuquerque Operations Office	183,496	228,718	253,460	+24,742	+10.8%
Chicago Operations Office					
Chicago Operations Office	3,697	2,100	2,100	0	0.0%
Argonne National Laboratory	4,000	4,025	4,310	+285	+7.1%
Brookhaven National Laboratory	5,190	1,982	2,014	+32	+1.6%
Total, Chicago Operations Office	12,887	8,107	8,424	+317	+3.9%
Idaho Operations Office					
Idaho Operations Office	18,795	19,371	22,127	+2,756	+14.2%
Idaho National Engineering and Environmental Laboratory	500	500	875	+375	+75.0%
Total, Idaho Operations Office	19,295	19,871	23,002	+3,131	+15.8%
Oak Ridge Operations Office					
Oak Ridge Operations Office	2,400	2,500	1,000	-1,500	-60.0%
Office of Scientific and Technology Information	4	8	8	0	0.0%
Oak Ridge National Laboratory	16,273	19,048	22,770	+3,722	+19.5%
Total, Oak Ridge Operations Office	18,677	21,556	23,778	+2,222	+10.3%
Richland Operations Office					
Pacific Northwest National Laboratory	700	570	950	+380	+66.7%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	478	1,305	1,700	+395	+30.3%
Lawrence Livermore National Laboratory	850	1,500	2,000	+500	+33.3%
Total, Oakland Operations Office	1,328	2,805	3,700	+895	+31.9%
Nevada Operations Office	0	1,500	1,500	0	0.0%
Morgantown Energy Technology Center	0	200	200	0	0.0%
Pittsburgh Energy Technology Center	5,602	4,862	1,200	-3,662	-75.3%

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Federal Energy Technology Center	0	1,250	0	-1,250	-100.0%
Headquarters	52,366	46,561	82,707	+36,146	+77.6%
Subtotal, Solar and Renewable Resources Technologies	294,351	336,000	398,921	+62,921	+18.7%
Use of prior-year balances	-24,447	0	-821	-821	0.0%
Total, Solar and Renewable Resources Technologies	269,904	336,000	398,100	+62,100	+18.5%

Site Description

Albuquerque Operations Office

Albuquerque Operations Office (ALO) is a Department of Energy Office located in Albuquerque, New Mexico. ALO provides procurement services and oversight of funding for work being conducted at Golden Field Office, Los Alamos National Laboratory, National Renewable Energy Laboratory, Sandia National Laboratories, and the six DOE Regional Support Offices located in Atlanta, GA, Boston, MA, Chicago, IL, Denver, CO, Philadelphia, PA, and Seattle, WA. AL also administers the Solar and Renewable Energy Photovoltaic Energy Systems Program.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL), located in Los Alamos, NM. LANL conducts research on the Electric Energy Systems High Temperature Superconductivity Program and the Hydrogen Research Program. LANL supports the Electric Energy Systems High Temperature Superconductivity Program by working to develop more efficient electrical transmission and distribution cables, power transformers, and large motors for industrial use. LANL is also studying the use of flywheel energy systems for efficient storage of electricity.

LANL serves as the lead laboratory in the research and development of proton exchange membrane fuel cells for direct hydrogen applications. This includes the application of new material systems, components, and construction techniques to meet the efficiency and cost targets associated with their industry CRADAs. LANL has developed a number of critical technologies for the most advanced fuel cell stacks.

Sandia National Laboratories

Sandia National Laboratories (SNL), located in Albuquerque, NM, Livermore, CA and Tonapah, NV, perform research for the Concentrating Solar Power, Photovoltaic Energy Systems, Geothermal Energy

Building Technology Research Programs. SNL serves as the lead laboratory in the development of reliable, economically-competitive, Concentrating Solar Power (CSP) technologies. SNL serves as the primary engineering and testing site for the CSP Program by operating the National Solar Thermal Test Facility (NSTTF). NSTTF covers 110 acres and includes five distance test areas: the Central Receiver Test Facility with a central tower and 222 heliostats; the Modular Solar Industrial Retrofit Trough Facility; the Engine Test Facility; and the Distributed Receiver Test Facility with two 75-kilowatt parabolic dishes. DOE has designated the NSTTF and the Solar Furnace as National User Facilities where qualified researchers from industry, academia, and other laboratories can use the facilities, making it possible for high-risk, high-payoff technologies to be developed and tested.

SNL supports the Photovoltaic Energy Systems Program with the principal responsibility for crystalline cell research, concentrating collector development, and systems and balance-of-systems technology development. Cell research activities support promising new concepts and innovative device fabrication techniques. Indoor and outdoor measurement and evaluation facilities provide support to industry for cell, module, and systems measurement, evaluation and analysis. Systems level work concentrates on application engineering, database development and technology transfer.

SNL serves as the lead laboratory for coordination of the Geothermal Drilling research. In cooperative projects with the U.S. geothermal industry, SNL performs research on advanced drilling systems, drilling measurement and control, drilling hardware development, and design and testing of high-temperature wellbore instrumentation. SNL coordinates the activities of universities and commercial research firms to rapidly bring promising geothermal drilling and instrumentation technologies to commercial availability.

The SNL Wind Energy Department staff work closely with counterparts at the National Renewable Energy Laboratory to provide the Wind Energy Systems Program and the U.S. wind industry with engineering expertise to further the program's knowledge and goals.

In support of the Electric Energy Systems Energy Storage Systems Program, SNL develops improved energy storage systems components including power conversion electronics and modular multi-functional energy storage systems. SNL characterizes the performance of integrated systems with customer-site data collection and identifies and evaluates the benefits of storage technologies in specific applications. SNL cooperates with industry partners in implementing the Program to increase awareness of the benefits of energy storage and options of providing storage alternatives.

As the lead engineering laboratory for the Solar Buildings Technology Research Program, SNL works with manufacturers to assist them in lowering the cost of solar products by introducing advanced manufacturing practices. SNL also provides technical support to assist builders and utilities in overcoming problems with the design or installation of solar water heating systems.

National Renewable Energy Laboratory

The National Renewable Energy Laboratory (NREL) located in Golden, Colorado, conducts fundamental and applied materials research on photovoltaic devices, photovoltaic module and systems development, data collection and evaluation on solar radiation, and cost-shared government/industry partnerships for the Photovoltiac Energy Systems Program. Basic research teams investigate a variety of photovoltaic materials, such as amorphous silicon, polycrystalline thin films, high-efficiency materials and concepts,

and high-purity silicon and compound semiconductors. NREL conducts simulated and actual outdoor tests on photovoltaic cells, modules and arrays. The test results are used in developing standards and performance criteria for industry.

NREL is the lead laboratory for the National Wind Energy Systems Program performing research in aerodynamics, structural dynamics, and advanced components and control systems related to wind energy. The National Wind Technology Center, located at NREL, provides research and testing facilities for fatigue testing of turbine blades, dynamometer testing of control and generator systems, atmospheric testing of turbines, and certification testing which is required for sales and operation in western Europe.

NREL serves as the lead laboratory supporting industry's development of biomass power technologies. These technologies include those based on combustion and gasification of biomass feedstocks. NREL is responsible for the development of advanced analytical methodologies (chemical and life-cycle) that are used to facilitate industry commercialization. These analyses include complete economic assessments of the relevant biomass technologies. NREL works with industry and academia to arrive at consensus points on technology costs and environmental performance. NREL also developed and operates a Thermochemical Users Facility. This state-of-the-art facility enables the private sector to cost-effectively test their power generating technologies and unit operations in a fully-instrumented pilot facility.

NREL is the lead laboratory for the Biofuels-Transportation Program. The Laboratory conducts biotechnology research and engineering development of biological systems for the conversion of biomass to fuels and chemicals, such as ethanol. Also, the Biofuels Program has established the Alternative Fuels User Facility at NREL which includes laboratories, integrated bench scale process equipment, and a one ton per day process development unit.

NREL serves as the lead laboratory for the Solar Buildings Technology Research Program. In this role, NREL coordinates tasks with the Sandia National Laboratories and directs technical tasks that are subcontracted to universities and industry. The primary goal of this program is to develop a low cost solar water heater. NREL also has research tasks to explore solar applications such as crop drying, absorption cooling, space heating, and solar lighting. NREL supports cooperative solar projects with builders and utilities by providing technical information about solar water heaters to the builders and utilities and receiving input from them to help guide the research program.

NREL also provides on-going research and development for the Geothermal Energy Systems, Electric Energy Systems and Storage, and the Concentrating Solar Power Programs.

Golden Field Office

The Golden Field Office (GO) located in Golden, CO, provides procurement services and oversight of work being performed at the National Renewable Energy Laboratory, as well as administering and managing projects for the Biomass/biofuels Energy Systems Program, the Electric Energy Systems and Storage Program, the Photovoltaic Energy Systems Program, the Concentrating Solar Power Program, and the Renewable Energy Production Incentive Program. Go manages Gasifier demonstration projects to advance technologies to convert biomass-wood and agricultural stock and waste into electricity.

GO manages the Superconductivity Partnership Initiative (SPI) for the Electric Energy Systems High Temperature Superconductivity Program. The SPI is 50% cost-shared with industry and consists of six projects to develop first-of-a-kind designs for more efficient power cables, transformers, industrial motors and flywheel energy systems.

GO manages two projects for the Photovoltaic Energy Systems Program, which are designed to increase market penetration and integrate PV product development. These projects are the Technology Experience to Accelerate Markets in Utility Photovoltaics (TEAM-UP) and the Building Opportunities in the United States for Photovoltaics (PV:BONUS) programs. GO utilizes cooperative agreements and requests for proposals to help industry realize the benefits of using photovoltaic systems and devices.

GO works with DOE program managers in the overall operation and management of the Concentrating Solar Power Program, including the contractual relations with industry partners. GO manages the Solar Two Project in Barstow, CA, and participates in the Solar Two Consortium. GO project managers are responsible for all technical and contractual requirements associated with the successful conduct and completion of the Solar Two Project.

GO is the lead office for the administration of the Renewable Energy Production Incentive (REPI) Program. REPI encourages the acquisition of renewable energy generation systems by state and local governments and non-profit electric cooperatives by providing financial incentive payments for energy generation systems which use solar, wind, geothermal or biomass technologies.

Chicago Operations Office

The Chicago Operations Office (CH), located in Argonne, IL, provides procurement services and oversight of funding for work being performed at Argonne National Laboratory and Brookhaven National Laboratory. CH also administers Solar and Renewable Energy programs such as the Biomass/biofuels Energy Systems and the Hydrogen Research Programs.

Argonne National Laboratory

Argonne National Laboratory (ANL), located in Argonne, IL, performs research and development for the Electric Energy Systems High Temperature Superconductivity Program to help in the development of more efficient electrical transmission and distribution cables, power transformers, and large motors for industrial use.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL), located on Long Island, NY, performs research and development for the Electric Energy Systems High Temperature Superconductivity (HTS) Program, and the Photovoltaic Energy Systems Program. BNL supports the HTS program by working with National Laboratory/industry teams and universities to undertake research on fundamental wire processing and application issues.

BNL has the responsibility for environmental, health and safety (ES&H) impacts associated with photovoltaic energy production, delivery and use. BNL conducts ES&H audits, safety reviews and incident investigations, and assists industry to identify and examine potential ES&H barriers and hazard control strategies for new photovoltaic materials, processes and application options before their large-scale commercialization.

Idaho Operations Office

The Idaho Operations Office (ID), located in Idaho Falls, ID, provides procurement services and oversight of funding for the Idaho National Engineering and Environmental Laboratory. ID also administers Solar and Renewable Energy programs such as the Renewable Indian Energy Resources and the Hydropower Programs, and is the principal field administrator of the Geothermal Energy Systems Program.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering Laboratory (INEEL), located in Idaho Falls, ID, performs research and development for the Hydropower and Geothermal Energy Systems Programs. INEEL has been the principal DOE laboratory for the Hydropower Program since the program's inception in 1977. INEEL serves as the engineering technical monitor for the Advanced Hydropower Turbine System Program and the Renewable Indian Energy Resources hydropower projects located in Alaska.

INEEL serves as the lead laboratory for coordination of the Geothermal Exploration and Geothermal Reservoir Technology research. In cooperative projects with the U.S. geothermal industry, INEEL performs research on fluid flow and solute transport modeling in hydrothermal reservoirs and conducts site investigations of geothermal resource potential. INEEL coordinates and interacts with other National Laboratories, universities, and commercial research institutions to consolidate their contributions to the research and technology development and thereby increase the utilization of geothermal energy resources.

Oak Ridge Operations Office

The Oak Ridge Operations Office (OR), located in Oak Ridge, TN, provides procurement services and oversight of funding for the Oak Ridge National Laboratory and the Office of Scientific and Technology Information. OR also administers the Solar and Renewable Energy Biomass/biofuels Energy Systems Program.

Office of Scientific and Technology Information

The Office of Scientific and Technology Information (OSTI), located in Oak Ridge, TN, performs standard distribution for all programs under the Office of Power Technologies including: Photovoltaic Energy Systems; Concentrating Solar Power; Biomass/biofuels Energy Systems; Wind Energy Systems; Geothermal Energy Systems; Hydrogen Research; and the Electric Energy Systems High Temperature

Superconductivity Programs. This distribution consists of publishing and maintaining on-line full text of eight electronic current awareness publications and the production of CD-ROM disks containing Photovoltaic reports.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL), located in Oak Ridge, TN, performs research and development on the Electric Energy Systems Transmission Reliability, the Biomass/biofuels Energy Systems, and the Hydropower Programs. ORNL is part of a national laboratory/industry/university consortium that was formed to support research in Transmission Reliability of electric energy systems. This consortium is a new initiative for fiscal year 1999. It is anticipated that ORNL will perform electric power system studies related to the impact of distributed resources on electric power distribution systems, perform an assessment of the technology and R&D control needs for real time system control, and assist in designing a test bed for field or simulation testing of distributed resource concepts.

ORNL manages the Bioenergy Feedstock Development Program (BFDP) to develop new and improved sources of biomass feedstocks for biomass energy systems. ORNL provides technical leadership for the program and actively fosters alliances among universities, other government agencies and industry. Major current components of the BFDP include energy crop development, environmental research, residue and forests research, resource economics, demonstration project support and evaluation, and communication. These efforts compliment the National Renewable Energy Laboratory and the Sandia National Laboratories' programs.

ORNL has the primary responsibility for environmental analysis and is the environmental technical monitor for the Advanced Hydropower Turbine System Program. This includes the technical oversight of laboratory biological experiments on stresses experienced by turbine-passed fish.

Richland Operations Office

The Richland Operations Office (RL), located in Richland, WA, provides procurement services and oversight of funding for the Pacific Northwest Laboratory.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL), located in Richland, WA, performs some on-going research for the Hydrogen Research Program.

Oakland Operations Office

The Oakland Operations Office (OAK), located in Oakland, CA, provides procurement services and oversight of funding for the Lawrence Berkeley and the Lawrence Livermore National Laboratories.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory (LBNL), located in Berkeley, CA, performs analyses of opportunities for wind energy applications in the restructured electricity market and administers various utility restructuring activities. In support of utility restructuring, LBNL conducts policy and technical analyses on utility regulatory policies at the state and federal levels. LBNL provides technical support to state organizations such as the public utility commissions and state energy offices on utility restructuring issues. LBNL provides guidance and support to the private and public market components of the utility industry, including the energy services industry, regional market transformation consortia, and public and private utilities.

LBNL also supports the analyses and proposed implementation of the Administration's proposed legislation on utility restructuring.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL), located in Livermore, CA, performs research and development for the Hydrogen Research Program. LLNL serves as the lead laboratory in the research and development of a high temperature solid oxide electrolyzer and two different systems for pressurized gas storage of hydrogen. LLNL is developing the materials and technical and engineering data on the preferred configuration for a solid oxide system that will simultaneously reform natural gas to hydrogen using the waste heat for a higher round trip efficiency. LLNL is capable of producing composite storage tanks for environmental testing to verify the advantages of various engineering concepts designed to increase storage capacity while reducing the costs of manufacturing the tanks.

Federal Energy Technology Center

The Federal Energy Technology Center (FETC) provides research and development on Solar and Renewable Energy programs with a major emphasis on the Hydrogen Research Program and some on-going research for the Biomass/biofuels Energy Systems Program. FETC will administer a cooperative agreement with Virginia Accelerator Corporation for an electron scrubbing demonstration project.

Headquarters and All Other Sites

The Office of Energy Efficiency and Renewable Energy (EE) funds research at six regional support offices located in Atlanta, GA, Boston, MA, Chicago, IL, Denver, CO, Philadelphia, PA, and Seattle, WA, and also provides funding at DOE Headquarters for various Solar and Renewable Energy procurements and interagency agreements in support of the EE mission.

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	1,000	1,869	750	-1,119	-59.9%
General Purpose Equipment	0	2,031	350	-1,681	-82.8%
Total Operating Expenses	1,000	3,900	1,100	-2,800	-71.8%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
96-E-1000 FTLB Expansion and Renovation Project, NREL	6,500	4,300	2,200	0	0	0
Total Construction	6,500	4,300	2,200	0	0	0

Solar Building Technology Research

Mission Supporting Goals and Objectives

Program Mission

The mission of the Solar Buildings Technology Research Program is to conduct research essential to the development of advanced solar thermal building technologies. These technologies can significantly contribute to the domestic energy needs of the United States.

The program supports DOE's mission to foster a secure and reliable energy supply that is environmentally sound and economically sustainable.

Program Goals and Objectives

Roof Integrated Solar Water Heater

The primary goal of the Solar Building Technology Program is to reduce the system cost and improve the reliability of solar water heating. The objective is to reduce the life-cycle cost from today's $0.08/kWh (thermal equivalent) to $0.04/kWh by FY 2003. Achieving this goal will make solar water heaters increasingly competitive in the residential market and reverse the trend that has seen their annual sales decrease from over 100,000 in the early 1980's to less than 8,000 in 1997. A second goal is to increase builder and consumer confidence in solar technology as it is applied to residential, commercial, and industrial buildings. There are two objectives supporting this goal: (1) assisting industry in the establishment of performance and reliability standards accepted throughout the U.S.; and (2) understanding the needs of builders and consumers.

Strategic Approach

This Program will be implemented in partnership with manufacturers, equipment suppliers, and installers. The existing solar thermal industry, however, consists of small, under-capitalized companies which do not have the capital resources or in-house technical expertise to overcome significant technical and market barriers presented by the fragmented infrastructure of builders, suppliers and consumers.

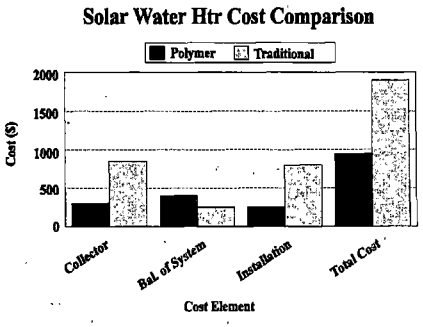
Another part of the program's strategy is to work closely with Federal agencies (e.g. HUD's "Partnership for Advancing Technology in Housing") and state energy offices (e.g. California Energy Commission). Cost sharing from government, utility, builder, and solar industry partners should be approximately $2,000,000 in FY 2000.

The Program's strategic approach consists of three key activities which will lead to cost competitive solar water heaters and increased consumer confidence in the technology: quality assurance, precompetitive field validation, and technology development.

Quality Assurance - The program will support development of models that estimate technology performance and reliability. These models will be the basis for voluntary national standards for solar water heating systems.

Precompetitive Field Validation - The program will work with builders, utilities, and energy service companies to identify the improvements necessary to make solar technology fully acceptable for the residential construction and commercial building markets. It will use their input to guide the program's R&D activities and validate those improvements through cost-shared field tests.

Technology Development - The major thrust for the program will be focused on developing a new generation solar water heater that reduces the cost and increases the service life of the technology. Contracts with universities and industry provide the mechanism for the new technology. Cost reductions will be realized through improved manufacturing processes, the use of less expensive materials (see chart), innovative design, and better integration of the solar collector into the building. This activity is supportive of recommendations by the President's Committee of Advisors on Science and Technology to establish an initiative on low cost solar water heaters. This also supports DOE's strategic goal of promoting the development of competitive and environmentally sound energy markets in the U.S. In addition, R&D would explore the feasibility of solar lighting (i.e. using fiber optics or light pipes to bring solar light into interior rooms).



Program Benefits

At the proposed funding levels, the Solar Building Technology Research Program is expected to yield the following benefits:

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.03	0.11
Energy Savings ($ Billions)	0.00	0.15	0.75
Carbon Displaced (MMTCE)	0.05	0.47	1.70

These benefits are derived from displaced energy consumption in residential and commercial buildings which collectively consume approximately a third of the primary energy used in the U.S. The Solar Buildings Program addresses a market that consists of 95 million households, 4.5 million commercial buildings, 9 million pools and spas, and 750,000 industrial processes that use steam at temperatures less than 400F. An estimated 1.2 million solar domestic water heaters have been installed in the U.S. with an additional 500,000 expected by 2010. Each system provides approximately 3000 kWh per year thermal

equivalent (10 MBTU/year). By the year 2020, solar energy could displace 0.11 quads of the thermal energy needed by the buildings market. Reducing the use of fossil fuels by that amount would improve the quality of our air, and reduce greenhouse gas emissions by 1.70 MMT (carbon equivalent).

Performance Measures

FY 2000 Performance Measures

- Achieve $0.07 per kWh (projected delivered energy cost) for solar water heating systems through improved manufacturing processes.

FY 2001-2006 Performance Measures

- Achieve $0.04 per kWh (projected delivered energy cost) for solar water heating systems due to low cost *next generation* solar water heating technology.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- In collaboration with the Solar Rating and Certification Corporation developed procedures for the voluntary industry certification of solar energy equipment to provide performance verification.
- Provided technical and field monitoring assistance to industry, Federal, and state governments for the installation of hundreds of solar water heating systems since the late 1970's. The performance history of some of these systems will be used to help develop reliability standards.
- Developed solar domestic hot water systems with levelized energy cost of $0.08/kWh, a reduction from about $0.20/kWh in the mid 1980's.
- Developed transpired collector technology for preheating building ventilation air with levelized energy cost of $0.04/kWh and 30 year lifetimes.

FY 1998 Accomplishments

- Support was provided to expand the rating and certification procedures for new system designs being developed by industry.
- A Cooperative Research and Development Agreement was initiated with the Salt River Agricultural Improvement and Power District to develop a low cost solar water heater. Cooperative projects were also established with Eugene Water and Electric Board and Lakeland Electric and Water. Similar solar water heating projects were established with several builders: including Pulte Homes and CAVCO Industries. Technical support (e.g. system evaluation) was provided to each. In addition, a study concluded that builders were concerned about the cost, aesthetics, and reliability of solar water heaters. Another study indicated considerable interest in solar water heaters among potential home buyers if a reliable, low cost system was an option.
- Completed the first phase of four contracts with solar manufacturers, which identified and quantified manufacturing improvements that could lead to cost reductions up to 20%. Selected contracts for

phase 2, which will assist the manufacturers in implementing improvements in welding, system control, and component design.

- Completed first phase of seven industry and three university contracts selected to evaluate concepts that have the potential to significantly reduce solar water heating costs. Concepts included freeze and overheating protection, polymer based systems, and use of heat pipes that could eliminate the need for pumps and controllers. It was shown that polymer materials have been developed which have the potential for withstanding high temperature and exposure to solar radiation. These polymers would replace the copper and glass that make up present solar water heaters. In addition, designs were developed which simplify the systems by eliminating the need for pumps and controllers, thus making the systems potentially more reliable.
- A Cooperative Research and Development Agreement (CRADA) with Energy Laboratory, Inc. (ELI) led to the development of *Black Crystal*, a selective absorbing coating for solar heat collectors that has the potential for replacing black chrome as the industry standard. Black Crystal does not have the environmental problems associated with chrome and can be produced with a fraction of the energy.
- Completed evaluation of four solar absorption A/C concepts. Studies completed during FY 1998 indicate that further solar absorption cooling R&D is not warranted at this time.

FY 1999 Planned Accomplishments

- Complete development of a standardized wind loading rating for solar collectors on roofs.
- A task will be initiated to develop models that can be used to establish reliability standards for solar water heaters.
- Universities and industry will complete feasibility studies of ten solar water heater concepts exploring the use of low cost materials (e.g. lightweight polymers which offer savings in the cost of the collector and its installation) and components (e.g. heat pipes which could lower cost by eliminating the need for pumps and controllers, and increasing system reliability). The best of these will form the basis of the *next generation* solar water heaters. Prototypes will be built and tested in the laboratory to determine their performance under a variety of simulated weather conditions. Accelerated tests will be conducted to predict the longevity of the polymer components; a critical question that must be answered. Existing methods of predicting the lifetime of polymers, however, are unable to predict as far into the future as the 10 to 15 years (minimum) that the solar system must work. Research will begin at NREL on developing an "ultra accelerated" method of predicting polymer lifetime.
- Implement manufacturing improvements that will lead to solar technologies capable of producing hot water at $0.07/kWh.
- Continue the Cooperative Research and Development Agreement with the Salt River Agricultural Improvement and Power District (SRP), whose goal is to develop a solar water heater that could provide hot water at a levelized cost of $0.06 to $0.07/kWh. Provide technical support to other utilities and builders that have established solar water heating programs. This effort is limited to technology development and includes system evaluation, analysis of system performance, and

assistance in solving problems such as materials degradation that industry is incapable of solving by itself.

FY 2000 Planned Accomplishments

- Expand existing certification procedures to include reliability standards.
- Complete the collaborative projects with utilities and builders established during FY 1998 and assess their impact on improving solar water heating technology. Complete CRADA with Salt River Project that has potential to reduce cost of solar water heat to $0.06/kWh.
- Achieve $0.07/kWh (projected delivered energy cost) for solar water heating systems through improved manufacturing processes.

FY 2001-2004 Planned Accomplishments

- Assist industry and state led efforts for the development of voluntary national installer certification standards and licensing procedures to assure quality installations of systems.
- Work with builders and utilities to test prototype *new generation* solar water heaters. This would include systems instrumented to obtain data concerning long term performance & reliability, materials & component longevity, and performance in a variety of climates.
- In collaboration with industry, develop next generation of solar equipment to provide reliable energy at $0.04/kWh for solar water heating.

Program Completion

Successful completion of the Solar Building Technology program will be attained when the Program's cost goal is reached ($0.04/kWh levelized life-cycle cost). It is expected that attaining this goal will make solar water heaters competitive with electric water heaters in many areas of the U.S. and natural gas water heating in some areas. As important, however, this translates to a family being able to purchase a solar water heater for about $1,000 and realizing a payback of that investment in about 4 years.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Space Conditioning and Water Heating	2,625	3,600	5,500	1,900	52.8%
Total, Solar Building Technology Research ..	2,625	3,600	5,500	1,900	52.8%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Space Conditioning and Water Heating			
■ **Quality Assurance** - The Solar Rating and Certification Corp (SRCC) will complete the task to make U.S. solar water heater standards compatible with international standards, thus enabling U.S. companies to more easily compete in international markets. Information related to problems associated with residential solar water heating systems in California, Oregon, and Florida will be put into a database and used to help in the development of reliability standards.			
■ The establishment of solar industry reliability standards for solar water heating systems will compliment the performance standards already established. It will benefit manufacturers by providing them information on which parts of their solar water heating system need improvement and will provide consumers information that will enable them to trade-off cost with performance and reliability. Consumer confidence in solar technology is necessary if DOE is to achieve its mission of developing solar energy as a reliable, environmentally sound option. This activity will continue through 2005. Its focus will evolve from developing performance standards to developing reliability standards and standards for installers of solar water heating systems that can be used as guidelines by states. The funding level is estimated to be sufficient to support the establishment of the reliability standards. This is based on experience in developing performance standards. . . .	140	100	300
■ **Precompetitive Field Validation** - Cooperative projects with utilities and builders will be continued to eliminate technical barriers that limit the use of solar water heaters. A CRADA with Salt River Project will be completed that develops a lower cost, roof integrated solar water heater. Technical support to Pulte Homes and CAVCO Industries will be provided.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Cooperative agreements with utilities and builders help maintain relationships that are important because they provide data from "real-life" systems that are not duplicated by researchers and engineers under controlled test conditions at NREL and Sandia. This data helps guide technology development activities and insures that the technology will satisfy the needs of those who sell it, install it, and buy it. This activity will continue through 2005, when the new, low cost solar water heater evaluation is completed. The funding level is determined necessary to support all existing cooperative agreements.	1,005	0	500
■ **Technology Development** - Research will focus on the two concepts which have the greatest potential for achieving the program's cost goal. Both systems are likely to be polymer based. Design improvements will be made to the prototypes tested during FY 1999 and new systems will be built and tested to determine their ability to withstand overheating and freezing. The accelerated lifetime testing of several polymer formulations will continue, as will the development of an "ultra accelerated" method of predicting polymer lifetime. A study will be completed to determine the potential of using fiber optics or light pipes to bring sunlight into the interior of buildings.			
■ This is an R&D effort that is attempting to use new materials and new designs to significantly decrease the cost of solar water heaters. As such, it entails a significant technical risk, but the amount was deemed appropriate for this stage of the research. Industry has indicated it is unable or unwilling to support this type of activity without DOE assistance. It will support the laboratory, university, and industry R&D that made great strides in FY 1998 to place the cost goal within reach. The funding level was determined by the Technology Managers at NREL and Sandia to be the minimum amount necessary for achieving the $0.04/kWh cost goal by 2003.	1,480	3,500	4,700
Total, Solar Building Technology Research.....	2,625	3,600	5,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Space Conditioning and Water Heating	
■ **Quality Assurance** - Builders and home buyers have emphasized the importance of reliability when considering solar water heaters. The increase would continue the effort begun in FY 1999 to establish voluntary reliability standards as a complement to the existing performance standards.	+200
■ **Precompetitive Field Validation** - A number of builders and utilities have established solar water heating programs. The increase would enable DOE to provide them technical support that is beyond the capability of the solar industry.	+500
■ **Technology Development** - The technology development program is expanded to reduce the cost of solar water heating technology to $0.04/kWh or less by FY 2003. Achieving this goal will make it competitive in wide areas of the U.S. This funding supports university and industry R&D.	+1,200
Total Funding Change, Solar Building Technology Research	+1,900

Photovoltaic Energy Systems

Mission Supporting Goals and Objectives

Program Mission

The mission of the National Photovoltaics Program is to conduct the research and development (R&D) necessary to enable photovoltaics (PV) to become a significant contributor to the United States domestic energy needs. The resources dedicated to R&D, in partnership with industry and academia, have advanced PV from a laboratory novelty to a growing U.S. industry that has the worldwide lead, with more than 40% of the cell and module sales. The challenge for the DOE PV program is to continue an effective and productive role in advancing PV technology and maintaining and enhancing a growing U.S. industry.

Program Goals and Objectives

By 2004, in partnership with the photovoltaic industry, universities and national laboratories, the National Photovoltaic Research Development & Deployment (RD&D) Program will 1) increase the efficiency of commercial modules from the current 7% to 12% when made from lower cost thin film materials and from the current 13% to 16% when made from more costly crystalline silicon materials; 2) reduce the retail sales price of commercial modules by 40% from current average costs of about $4.25/Watt; 3) increase the lifetime of fielded systems from the current 10-15 years to greater than 25 years; and 4) increase the U.S. PV industry cumulative sales of power modules from 265 Mega Watts (MW) in 1997 to 1000MW (U.S. and export sales). These advancements are necessary to develop cost competitive products that can sustain the emerging PV industry and will also ensure successful implementation of the Million Solar Roof Initiative. By the year 2004 we will have reached 60% of the program's technical goals and industry will have introduced products into the market place such that there will be 500MW of cumulative installed systems in the U.S. By the year 2004, based on the current U.S. PV industry growth rate, the U.S. PV industry will have captured 50% of the world market.

In addition to the 5-year goal, the Photovoltaic Program has established near-term (FY 2000) and longer term goals to ensure steady progress and successful implementation of the Program. Success will be attained when photovoltaics can provide more cost competitive electricity than other forms of electrical generation. The PV Program's near-term goal is for PV to produce electricity at $0.12 to $0.20/kilowatt hour (kWh) by 2000, based on installed system costs of $3.00 to $7.00 $/Watt and module efficiencies of 10-16%. The longer term goal is to reach $0.06/kWh electricity with installed system costs from $2.00 to $4.00/Watt. PV must also be more reliable and convenient to use than the next best alternative for each application. Therefore, the program is working towards system lifetimes greater than 20 years and with manufacturers to simplify system design and develop uniform standards.

Strategic Approach

The Federal government invests in PV to help establish a domestic energy option that can also protect the environment and foster an emerging high-technology industry that creates high-value jobs. Industry's stake in opening new markets and applications has increased because of rising competition. DOE's strategy is to concentrate on areas of high-risk, high-payoff research and development where private sector companies traditionally under invest and where DOE has the most valuable expertise and can make a significant impact with limited funds.

This strategy includes conducting fundamental research on several photovoltaic semiconductor materials to resolve issues that limit current technology, and to conduct basic R&D for breakthrough, non-conventional PV technologies aimed at dramatic cost/kW reductions. In addition, advanced materials and devices work will continue cost-shared research with industry to improve device efficiency and stability, particularly for large-area thin film deposition systems. Process R&D will be conducted by way of cost-shared industry research (greater than 50% by industry) to reduce module manufacturing costs, improve module performance, and stimulate investment in new manufacturing lines. These research activities are core program efforts to develop the advanced technologies that are essential to maintaining U.S. competitiveness in the next 5 to 10 years. To further support the strategy, module reliability research will be conducted to improve lifetime in the field, and system component reliability efforts will be increased to help improve the lifetime of fielded systems. Efforts to deploy PV systems in cost-shared utility projects designed to establish technical and economic validation in specific high-value applications will also be conducted. In addition, research and analysis relating to restructuring in the electric utility industry will be conducted on issues associated with integration of PV systems into an increasingly competitive industry framework.

In summary, the FY 2000 budget presents a balanced effort in fundamental and applied research, materials and device development, process R&D, module reliability, and system testing and evaluation. A major portion of this work will be undertaken via competitive procurement resulting in highly leveraged cost-shared projects with the emergent PV industry.

This balanced, aggressive set of research activities will maintain industry growth and momentum, two important ingredients necessary to successfully meet program goals. The PV industry lost market share during the 1980's when budgets were reduced. The industry (with Federal research and support) has worked very hard over the past ten years to re-establish small, incremental market increases in spite of strong foreign competition. In 1997, the U.S. PV industry had its largest increase in sales of modules in over a decade, yet could only gain one percentage point in market share, from 43% to 44%. This is significant in two ways: the momentum of the program is at its highest in ten years, but foreign competition is also the strongest it has ever been. The proposed FY 2000 budget will help maintain industry's growth and momentum during a period of strong foreign competition.

The Photovoltaics R&D program is complemented by the Million Solar Roofs Initiative - which seeks to facilitate the installation of photovoltaic and solar hot water systems on one million buildings across our nation by 2010. These installations will result in substantial field experience with this technology by electric utilities, engineers, developers and others and decreases in production costs by manufacturers as market demand increases.

Program Benefits

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.01	0.05
Energy Savings ($ Billions)	0.00	0.02	0.16
Carbon Displaced (MMTCE)	0.00	0.08	0.72

The U.S. photovoltaic industry has been growing at an average annual rate of 24% over the past eight years and is now the leader in sales throughout the world. In 1997, over 70% of sales were exported to foreign markets. The strong and aggressive DOE R&D Program has been the key to enabling the U.S. PV industry to be the technology and product leader in a very competitive and rapidly growing global marketplace.

In 2010, photovoltaic systems are estimated by McNeil Technologies to produce approximately 3,000MW, the same electricity generating capacity as 3-5 coal-fired plants, which will reduce annual carbon dioxide emissions equivalent to what is now produced by 850,000 cars.

Performance Measures

FY 2000 Performance Measures

- Increase the conversion efficiency of commercial thin film modules from the current 7% to 10% and from the current 14% to 15% for crystalline silicon.
- Develop a 13%-efficient stable prototype thin-film module.

FY 2001 - 2006 Performance Measures

- Test a low-cost, stable module encapsulant compatible with 30-year module life.
- Achieve greater than 300 megawatts of cumulative installed PV systems in the U.S.
- Increase the efficiency of commercial thin film modules to 12% and crystalline silicon modules to 16%.
- Test fielded PV system compatible with 25-year life.
- Increase the U.S. PV industry cumulative sales of power modules from 265 megawatts in 1997 to one gigawatt.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- The first commercial copper indium diselenide (CIS) thin film module at 9.5% efficiency was achieved by Siemens Solar Industries in Camarillo, California.

- Two new photovoltaic manufacturing plants came online in 1997: a 5MW amorphous thin film plant by United Solar in Troy, Michigan, and a 10MW amorphous thin film plant by Solarex in Virginia.
- A new photovoltaic roofing shingle was commercialized by United Solar which won awards for best new product of the year by Popular Science and Discovery magazines.

FY 1998 Accomplishments

- Developed an 18% efficient prototype thin-film solar cell.
- Achieved retail sales of 8% efficient cadmium telluride (CdTe) large area modules by industry.
- Established at least 9 State and community partnerships for the Million Solar Roofs Initiative.
- Two new photovoltaic alternating-current (AC) modules commercialized by Advanced Energy Systems and Ascension Technology won awards for best new product of the year by Popular Science magazine. The modules feature built-in microinverters that allow them to act as their own AC generators.
- Initiated the government, industry, state and community partnerships to put solar energy systems on one million roofs.

FY 1999 Planned Accomplishments

- Complete Phase 2 Preliminary Engineering Development and initiate Phase 3 Prototype Development/Field Verification for the PV:BONUS project.
- Develop 13% efficient stable prototype amorphous silicon solar cells.
- Develop codes, standards and safety specifications for residential PV roof systems.
- Support the Million Solar Roofs Initiative by installing 15,000 energy systems and establishing up to 16 additional major partnerships.
- Complete round 3 projects initiated in FY 1998 under the Partnerships for Technology Introduction and implemented through the Utility Photovoltaic Group (UPVG).

FY 2000 Planned Accomplishments

- Develop 13% efficient stable prototype thin film module (either CdTe or CIS).
- Identify 2-4 new and novel materials and cell devices with potential for low cost future generation PV options.
- Develop low cost options for 35% high efficiency tandem concentrator cell.
- Identify a low cost, stable module encapsulant compatible with 30-year module life.
- Install 26,000 solar energy systems in support of the Million Solar Roofs Initiative, bringing the total number of installed systems to 51,000.

Program Completion

Successful completion of the Photovoltaic program will be attained when the cost of PV generated electricity is cost competitive with conventional distributed power generation ($0.06/kWh). With continued support for a strong and aggressive R&D Program, this goal can be met in the 2010 to 2015 time frame.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Fundamental Research	11,000	11,000	20,309	+9,309	+84.6%
Advanced Materials and Devices	24,000	27,000	27,000	0	0.0%
Collector Research and Systems Development	29,691	34,200	46,000	+11,800	+34.5%
Total, Photovoltaic Energy Systems	64,691	72,200	93,309	+21,109	+29.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Fundamental Research			
■ **Measurement and Characterization** - Support industry and university research groups in advancing material and cell technologies by characterizing cell materials and devices, and reducing efficiency limiting defects in cell materials. The funding level is considered appropriate based on laboratory scientific staff experience, and through the development of a comparative analysis with similar research activities. Most PV companies cannot afford large teams with expensive laboratory facilities of their own to conduct long-term, high-risk basic research activities.	5,500	5,500	5,500
■ **Basic Research/University Programs** - Improve the understanding of defects in conventional crystalline silicon and thin film materials that limit efficiency. Support research to advance the understanding of cell material growth, deposition processes, semiconductor theory, and characterization methods and standards. Begin second year of university research on new and novel materials and cell devices. The funding level is considered appropriate based			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
on laboratory scientific staff experience, and through the development of a comparative analysis with similar research activities. Most PV companies cannot afford large teams with expensive laboratory facilities of their own to conduct long-term, high-risk basic research activities.	5,500	5,500	5,500
■ **Non-Conventional Breakthrough R&D** - Issue new competitive solicitation on basic R&D for breakthrough, non-conventional PV technologies - liquid cells, polymers, biochemical and biomimetic processes, etc. - aimed at dramatic cost/kW reductions. The funding level is considered appropriate based on laboratory scientific staff experience, through the development of a comparative analysis with similar research activities, and the PV industry's inability to fund long-term basic research on their own.	0	0	4,309
■ **High Performance Advanced Research** - Begin High Performance PV Initiative to support research to substantially increase the efficiency of two key photovoltaic technologies: multijunction concentrating cells and large-area, monolithically interconnected thin films. Fundamental research aimed at major innovations is required to essentially double the conversion efficiency of thin films from their current 8-10% to 15-20%, and to increase III-V-based multijunction cells from 30% to 40% under 500X concentration. In-house national laboratory expertise as well as competitive solicitations to universities and industry will be used to conduct innovative research on thin films and provide insights into III-V-based semiconductor material systems and devices.			
■ Research on thin films will include copper indium gallium diselenide (CIGS), cadmium telluride (CdTe), multijunction amorphous silicon with reduced Stable Wronski effect, film crystalline silicon materials, and multijunction combinations of the above.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Research on III-V-based material systems will include 2-, 3-, and 4-junction cells made up of gallium arsenide (GaAs), gallium indium phosphide (GaInP), gallium indium arsenide nitride (GaInAsN), and other quaternary materials. Successful development of the 4-junction cell will allow a 33% efficient concentrating module under 500X concentration. Both the enhanced thin film approach and the multijunction III-V approach will yield dramatically reduced dollar per watt values for terrestrial photovoltaics. The funding level is considered appropriate based on staff experience and historical precedence in similar research activities.	0	0	5,000
Total, Fundamental Research.	11,000	11,000	20,309

Advanced Materials and Devices

■ **Thin Film Partnership Program** - Pursue efforts within the thin film partnership program to achieve cost-effective thin film technologies by supporting research teams made up of leading scientists from industry, universities and national laboratories, who work together to define and carry out shared activities. Industry and university participants are selected through competitive solicitations. FY 1999 activities will support the second year of 3-year cost-shared contracts with industry to develop a 13% efficient prototype stable amorphous silicon module; solve degradation of copper indium diselenide (CIS) modules due to water vapor ingress; establish reliable high-throughput, high-yield CIS deposition processes to achieve prototype 13% efficient large area modules; and identify stress induced loss mechanisms for cadmium telluride (CdTe) based cells. The funding is considered appropriate based on staff experience and historical precedence in similar activities. Developing thin film technologies is a major thrust of the Program and receives the most funding because most scientists agree that thin film technologies have the best chance for attaining the Program's long-term goal of $0.06/kWh.	0	0	19,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Increase funding for 4-5 additional Thin-Film Partnership industrial contracts. Achieve 13% efficient stable amorphous silicon cells; 10% stable amorphous silicon modules; and a large increase in the commercial production of 8.5% efficient CdTe thin film modules. The funding is considered appropriate based on staff experience and historical precedence in similar activities. Developing thin film technologies is a major thrust of the Program and receives the most funding because most scientists agree that thin film technologies have the best chance for attaining the Program's long-term goal of $0.06/kWh.	16,000	19,000	0
■ **Crystalline Silicon/High Efficiency Devices and Reliability** Support research on silicon defects and high efficiency devices. Work with high efficiency concentrator cell industry to develop low cost options for 35% tandem cells. Develop innovative silicon crystal growth methods with improved throughput, conversion efficiency, and lower energy and materials cost than current methods. Conduct environmental stress testing of emerging PV modules developed through Thin Film Partnership and PVMaT programs. The funding level is considered appropriate and represents core program efforts to develop the advanced technologies that are essential to maintaining U.S. competitiveness and attaining near; mid- and long-term goals.	8,000	8,000	8,000
Total, Advanced Materials and Devices	24,000	27,000	27,000
Collector Research and Systems Development			
■ **Manufacturing R&D** - Complete second year and begin third year of 3-year Photovoltaic Manufacturing Technology (PVMaT) contracts to accelerate cost reductions and produce higher performance modules. These contracts address manufacturing R&D related to PV system components other than modules, such as batteries and inverters, to improve and reduce overall system costs. Issue a new competitive solicitation in FY 2000 to develop new material and insitu process diagnostics needed for PV module scale-up and successful manufacturing.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
All new contracts will exceed 50% cost-sharing. The funding is considered appropriate based on an extensive industry-wide survey that concluded that PWMat is the single most effective project that assists U.S. industry in reducing costs. Industry cost-sharing averages 40% (small business: 30%; large business: 50%) which further substantiates industry's support.	0	0	16,000
■ Fully fund 15-18 new three year PVMaT contracts to improve module manufacturing processes. These contracts are expected to achieve manufacturing cost reductions of 50% from 1996 levels. Completed third year of PVMaT three-year contracts initiated in FY 1996 to reduce manufacturing costs and improve processing of thin film technologies and balance of system components. Awarded additional three-year contracts that emphasized advanced manufacturing technologies for producing higher performance and lower cost commercial thin film and thin silicon modules.	9,000	10,600	0
■ **Systems Engineering & Reliability** - Conduct system engineering tests to validate the performance, safety, reliability and cost of fielded systems and components. Support development of domestic and international standards and codes, and procedures for certifying performance of commercial systems. Achieve fundamental understanding of photo/thermal/chemical/environmental factors that influence the stability of encapsulated materials and performance of PV cells in modules. Provide $1,500,000 to support ongoing research at the SE and SW regional experiment stations.			
Systems engineering and reliability research is critical to achieving the Program's goal of developing modules and systems that can last 30 years in the field. Cost competitiveness for PV generated electricity is directly dependent on payback over the life of the system under actual operative conditions. The funding level in considered appropriate based on the critical role system reliability plays in the success of the Program.	0	0	16,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Support efforts to develop codes, standards and safety specifications for building integrated residential and commercial systems. Continue efforts to evaluate and monitor utility grid tied systems. Maintain reliability research to improve system component performance and reduce O&M costs. Collaborate with U.S. industry to increase system and balance-of-systems efficiency and reliability to achieve additional cost-reduction of about 35% for installed systems in the year 2000 (a savings of about $2.50 per watt from the present $8.00 per watt for installed systems) and resulting from improved design, efficiency and quality control.	12,387	16,000	0
■ **PV Building Integrated R&D** - Complete Phase 3 Prototype Development/Field Verification contracts for PV:BONUS II. Assess technical progress and marketing contractors' success of PV:BONUS to determine future activities. Increase R&D on advanced PV Building concepts, tools, and modeling procedures in support of industry efforts for technology development/deployment to address technical barriers to expanded markets for PV in the buildings sector. Continue development of PV integrated design concepts and engineering practices to expand use of PV in residential and commercial buildings. The funding is considered appropriate based on a comparative analysis with similar product development R&D efforts, and to successfully complete the multi-year PV:BONUS II project and honor all contractual commitments.	0	0	5,000
■ Fund Phase 2 Preliminary Engineering Development contracts for PV:BONUS II and initiate Phase 3 Prototype Development/Field Verification by awarding PV Building Integrated contracts to best Phase 2 performers. Provide technical support for accelerated use of renewables in as many as one million new buildings by 2010. The funding is considered appropriate to successfully complete the multi-year PV:BONUS II project and honor all contractual commitments.	0	2,300	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Assessed the performance of installed systems. Completed Phase I Concept/Business Plan Development activity for the initial awardees under PV:BONUS II. Selected most attractive performers for the Phase 2 Preliminary Engineering Development of new PV building integrated products. Conducted generic technology development research to address technology barriers and industry priorities and needs for expanding market opportunities in the building sector.	1,500	0	0
■ **Partnerships for Technology Introduction** - Complete testing and verification of all utility and residential grid-tied PV systems installed through previous energy partnerships. Issue new competitive solicitation in FY 2000 for highly leveraged projects emphasizing building integrated applications, including public and private school buildings. All new projects will exceed 50% cost sharing. The funding is considered appropriate because efforts to deploy new products and validate them in the field are critical to meeting the Program's goals and strategy to increase user acceptance in the utility sector.	0	0	6,000
■ No new contracts are planned for FY99. The new projects initiated in FY98 emphasizing building integrated applications will be completed and testing and verification activities will be conducted in FY99. Complete fabrication of the eight utility grid-tied PV systems under UPVG. Issue new solicitation for projects emphasizing building integrated applications.	1,804	3,800	0
■ **Million Solar Roofs (MSR) Initiative** - In FY99, up to 16 additional major Partnerships will be added to the 9 existing Partnerships established in FY98. These 20 to 25 Partnerships have made preliminary commitments to install over 750,000 solar energy systems by 2010. In FY 2000, we will significantly expand work on financing mechanisms, measurement and evaluation, technical standards and infrastructure such as net metering capability in support of the State and Local Partnerships. Technical assistance will be provided to the Partnerships to familiarize them with solar			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
energy technologies and evaluate their capabilities and limitations and will support consumer education efforts through the Partnerships and in conjunction with utilities. General training and technical assistance will be provided to Partnerships, utilities, industry groups, financial institutions and governmental entities. Establishment of a national MSR registry jointly with state and local governments, utilities and other MSR partners will be fully implemented. The funding level is appropriate based on comparative analysis of similar activities. Also fulfills strategic objectives in Presidential Initiative.	0	0	3,000
■ Conduct training workshops on the design, operation, maintenance, and repair of solar technologies. These workshops will be for state and local agencies, builders, designers, and developers. Begin development of an outreach program to educate consumers about solar technology and familiarize them with the MSR initiative. An additional 15 major partnerships will be formed. Partners will be provided technical assistance as needed. The funding level is appropriate based on comparative analysis of similar activities. Also fulfills strategic objectives in Presidential Initiative.	0	1,500	0
■ Developed and implemented Million Solar Roofs Action Plan in response to Presidential Initiative. Coordinated activities with other Federal Agencies (e.g. HUD, EPA, DOD). Formed 9 partnerships that include commitments for a total of 506,400 solar roofs by 2010.	5,000	0	0
Total, Collector Research and Systems Development.	29,691	34,200	46,000
Total, Photovoltaic Energy Systems.	64,691	72,200	93,309

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Fundamental Research	
■ Increase includes $4,309,000 for new competitive solicitation on basic research for breakthrough, non-conventional PV technologies aimed at dramatic cost/kW reductions; and $5,000,000 new High Performance Advanced Research to substantially increase the efficiency of two key technologies: large-area monolithically interconnected thin films, and multijunction III-V based concentrating cells.	+9,309
Advanced Materials and Devices	
■ No changes.	0
Collector Research and Systems Development	
■ Increase includes $5,400,000 to issue new solicitation under PVMaT for insitu diagnostics in PV processing lines resulting in five to seven new contracts with industry; $2,700,000 to complete Phase III contracts under PV:BONUS II; $2,200,000 to issue new solicitation emphasizing building integrated applications; $1,500,000 to increase work on training, financing, standards and codes, and infrastructure issues.	+11,800
Total Funding Change, Photovoltaic Energy Systems	+21,109

Concentrating Solar Power Program

Mission Supporting Goals and Objectives

Program Mission

The Concentrating Solar Power (CSP) Program works with U.S. industry to develop economically competitive CSP technologies which will improve our nation's energy security through greater diversity of supply; reduce greenhouse gas emissions; and create business opportunities for U.S. industry both here and abroad, resulting in jobs for U.S. workers. CSP technologies will be able to take advantage of utility restructuring by providing technology options capable of providing a significant contribution to state-sponsored portfolio standards and system benefit charge (renewable energy incentive) programs.

Solar Dish/Engine System on Display at the Pentagon

- 25kW power
- Hybrid Stirling (Solar/Natural Gas)
- Near-term energy cost < 20¢/kWh

Program Goals and Objectives

CSP technologies use various mirror configurations to concentrate the heat of the sun to produce electric power. The current CSP Program portfolio contains systems which range in size from the 10-25kW dish/engine demonstration units, for remote and distributed power applications, to the 354MW of parabolic trough systems which have been producing reliable solar power in Southern California for over 10 years. The CSP portfolio also includes power towers, like the 10MW Solar Two plant, which has the unique ability to utilize thermal storage to put "sun in a bottle" for use when the sun is not shining. Because of their use of heat, all CSP technologies can be hybridized with other fuels to provide high-value dispatchable power on demand. These attributes, along with world record solar-to-electric conversion efficiencies, make CSP an attractive renewable energy option in the U.S. Southwest and other sunbelt regions around the world.

Our role at DOE, is to provide innovative and viable technology options that U.S. industry can then take to the marketplace. The five-year goal of the CSP Program is to work with U.S. industry to develop reliable distributed CSP systems (i.e., 4,000 hrs. between failures) and dispatchable systems capable of producing power in the $0.06 to $0.08/kWh range. Achievement of these program objectives will further the Comprehensive National Energy Strategy (CNES) goals of (1) improving global environmental quality, (2) providing future generations with a robust portfolio of clean and reasonably priced energy sources, and (3) promoting the development of open, competitive, international energy

markets. With MW-scale systems, CSP technologies have the potential to make a significant contribution to DOE's Strategic Plan objective to develop renewable technologies capable of doubling non-hydroelectric renewable energy generating capacity by 2010.

Strategic Approach

Over the past ten months, the CSP Program has undergone the most significant overhaul in its history, including a change in name (from Solar Thermal Energy Systems to Concentrating Solar Power). All program elements have undergone extensive review and revision, and all members of the CSP Program's constituency have had opportunities to participate. The objective has been to focus resources on activities which are appropriate to the emerging restructured utility environment and which can be carried out in a reasonable time frame with a conservative budget. Management strategies have been revised where needed, and a new five-year plan has been developed. Rather than focus on specific projects, "paths" addressing core program priorities have been defined and program elements to support these paths have been identified. The result is a Federal program with an appropriate government role which is enthusiastically supported by industry, in tune with current U.S. electricity trends, and poised to provide a significant contribution to the nation's energy needs. FY 2000 is the first budget year for which planning and decision making are guided by the revised program and new multi-year plan, although implementation of the path concept has begun in FY 1999. Program activities are categorized by the four paths described below.

The first path, *Develop and Demonstrate High-Reliability Distributed Power Systems,* initially focuses on improving the reliability of dish/engine systems for emerging markets for distributed energy sources. Distributed power refers to power generated close to the point of demand. These markets currently support remote power prices that can exceed $0.30/kWh. Activities undertaken on this path will result in orders of magnitude improvements in system reliability, and will achieve energy costs in the $0.09 to $0.11/kWh range within six years.

The second path, *Reduce Costs of Dispatchable Solar Power,* includes initial activities in two areas: advanced trough component R&D and the development of high-temperature CSP systems. Dispatchable power refers to power available during periods of peak demand, even when the sun is not shining. Recent trough technology roadmapping exercises with industry have identified opportunities for cost reductions which will provide a leading position for U.S. industry in bidding on international projects currently before the World Bank, and will re-open a domestic market for trough systems. High-temperature system development will take the lessons learned from the Solar Two power tower, which is completing its operation in mid FY 1999, and will apply them to advanced high-temperature component technologies, including those with storage capabilities. Early demonstrations and development efforts, supported by both green power markets and multilateral organizations such as the Global Environment Facility, will lead to a "next generation" of plant designs capable of producing dispatchable power for $0.6 to $0.08/kWh within five years. Since these systems are capable of meeting highly-valued daytime peaking power needs, they will be competitive at these prices.

Penetration of broader domestic and international markets will require longer-term research into advanced technologies. This will be covered by Path 3, *Develop Advanced Components and Systems.* Development of advanced technologies (e.g., heat-pipe receivers, high-temperature components,

advanced materials), coupled with economies of scale arising from expansion into high-value markets, will allow CSP systems to compete in dispatchable and distributed markets for $0.04 to $0.06/kWh. At these prices, U.S. industry will be able to make CSP systems a self-sustaining component of the energy economy.

In parallel with these three major technology paths, we will also pursue a fourth path which is low in cost, but essential to keeping program activities on track: *Expand Strategic Alliances and Market Awareness.* This path will keep our technology efforts focused on the most critical needs of U.S. industry, ensure a technology capable of meeting market needs, and support domestic and international information flow and policy decisions favorable to renewable energy.

Program Benefits

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.00	0.03
Energy Savings ($ Billions)	0.00	0.01	0.09
Carbon Displaced (MMTCE)	0.00	0.06	0.42

These benefits correspond to providing enough electricity for 350,000 homes in the year 2000.

Performance Measures

FY 2000 Performance Measures

- Achieve 1,000 hours of unattended operation on a single dish/engine system in field testing.
- DOE advanced technology used by U.S. trough team in competitive project bid.

FY 2001 - 2006 Performance Measures

- Reduce installed costs below $3,500/kW for dispatchable solar power systems.
- Achieve 4,000 hours of unattended operation on dish/engine systems in field testing.
- Validate feasibility and complete conceptual design of high-temperature concentrating solar system capable of generating power for $0.04/kWh.

Significant Accomplishments and Program Shifts

Pre-1998 Accomplishments

- Achieved a 29.4% world record solar-to-electric system conversion efficiency with the Advanco dish/Stirling system.

- The ten-year-old Solar Electric Generating Systems (SEGS) trough plants continue to operate reliably, and through improved O&M technologies and modest design upgrades, produce more energy annually than when new.
- The Solar Two power tower achieved an instantaneous power production of 11 MW (one MW, or 10%, higher than rated capacity) and demonstrated power production at night using molten salt (solar-on-demand capability).

FY 1998 Accomplishments

- Solar Two: completed 100 hour acceptance test; generated power continuously for 153 hours (over 6 days) using sun and stored hot salt; and achieved over 1,500 MW and 80% availability over a 30-day period.
- Installed 2 technology validation 25kW dish/engine systems in the field, including a successful demonstration at the Pentagon.
- Installed four mass producible heliostats – two at lab sites (for reliability testing and wind load studies) and two in a utility environment.
- Fabricated and tested hybrid solar/natural gas heat-pipe receiver design for distributed power systems capable of increasing performance by 25% over current direct illuminated receiver (DIR) design.
- Published initial set of technology characterizations for parabolic troughs, power towers, and dish/engine systems.

FY 1999 Planned Accomplishments

- 750 hours of reliable operation on a single distributed CSP system.
- Reduce parasitic power usage at Solar Two from 25MWh to the design goal of 11MWh/day.
- Developed molten-salt technology improvements which will simplify the process and lessen the cost of energy storage.
- Developed a lightweight structural facet which will decrease the cost and increase the reliability of concentrators for both distributed and dispatchable solar power systems.
- The Solar Two Power Tower project, demonstrating the dispatchability of solar power during periods of peak demand, direct funding for this project will be ended. Any further efforts that may be justified will be as part of a new cost-shared contract agreement.

FY 2000 Planned Accomplishments

- Initiate U.S. Trough Project to develop advanced trough components for near-term applications.
- Develop and test off-grid capability for remote power systems; install unit on Indian reservation for testing.
- Build first advanced DECC distributed solar power system; begin field testing.

FY 2001 - FY 2004 Planned Accomplishments

- Perform reliability testing on distributed solar power systems in the field, achieving 80% availability over a 6-month period.
- Complete conceptual design of thermal storage option for trough systems.
- Field-test distributed power systems in a variety of user environments (e.g., end-of-line, land-fill gas sites, remote locations) accumulating in excess of 10,000 hours of on-sun operating data.
- Scale-up and field-test advanced trough components capable of generating power for $0.08/kWh).

Program Completion

Distributed power systems must first validate acceptable reliability and operating characteristics in their applications, and then progress with reducing installed costs. Field validations for grid-connected reliability will be completed by 2004, with achievement of 4,000 hours mean time between failures (MTBF). Reliability for off-grid applications will be established by 2006, achieving reliability targets that will be significantly higher than for grid-connected applications. By the year 2004, component cost reduction activities are expected to achieve system designs with energy costs reaching $0.11/kWh or less in high-volume production; this will be competitive in selected distributed markets.

For CSP technologies competing in dispatchable power markets, the program will achieve cost reductions to $3,500/kW or less by 2002, and $3,000/kW or less by 2004. Energy costs will be $0.08/kWh or less by 2004. The CSP Program will end direct support of the Solar Two power tower in FY 1999. Follow-on activities involving high-temperature component R&D with applications to advanced CSP applications will be initiated. By the year 2003, design specifications will be fixed for the advanced CSP high-temperature systems. These systems will represent the next reduction in costs for the technology. Cost projections for high-temperature systems are in the $0.04 to $0.06/kWh range (50% of current dispatchable CSP technology costs). The current trough roadmap defines specific component development programs with high cost-reduction potential.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Distributed Power System Development	3,550	5,300	6,700	+1,400	+26.4%
Dispatchable Power System Development	6,850	5,970	5,340	-630	-10.6%
Advanced Component and System Research	5,117	4,990	5,960	+970	+19.4%
Strategic Alliances and Market Awareness	800	740	850	+110	+14.9%
Total, Concentrating Solar Power Program	16,317	17,000	18,850	+1,850	+10.9%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Distributed Power System Development			
■ **System Reliability** – The CSP Program will be working with three industry partnerships to develop and demonstrate reliable dish/engine systems. Under the Utility Scale Joint Venture Project (USJVP), two 25kW systems were built in FY 1998, and a third in FY 1999. All three of these systems will undergo intensive reliability monitoring in FY 1999, and early FY 2000, with a near-term goal of reaching 1,000 hours mean time between failure (MTBF). A second team, under the Dish/Engine Critical Components (DECC) Initiative, began their Phase I design and fielded one 25kW system in FY 1998. In FY 1999, additional components will be assembled and tested, with several full-scale Phase II prototypes to be installed in FY 2000. This activity is built around design improvements that will increase overall system reliability. Cost-share for both of these projects is 50%. A third project was launched in FY 1999 to field an advanced-technology 10kWe solar-powered dish/engine system at a remote, off-grid site in the Southwestern U.S. (e.g., an Indian reservation in Arizona or New Mexico). In FY 2000, the off-grid capability of the system will be developed and tested. These systems will have an early market entry price of less than $0.20/kWh, and are equally suited for either stand-alone operation or for being hybridized with natural gas or diesel fuel. This funding level, based on program staff experience and analysis of cost-sharing potential, will support the performance and reliability monitoring required to reach the goal of 4,000 hours MTBF, which is essential for commercial viability.....	3,550	5,300	5,100
■ **System Testing and Field Validation** – Field validation efforts will begin under the USJVP as it enters Phase III, and for the DECC under Phase II, with the opportunity to install multiple systems at sites in the U.S. Southwest. Systems will be installed at different types of user sites (e.g., hybrid dish/engine systems at land-fill gas facilities). This level of funding, based on program staff experience and analysis of cost-sharing potential, will supply the objective data necessary for product improvements aimed at giving U.S. industry a viable distributed solar power option.....	0	0	960

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Cost Reduction** – The SolMaT Initiative is directed at developing manufacturing techniques to reduce the cost of low-volume production. Distributed SolMaT activities will include manufacturing design improvements, facet production verification, and advanced receiver development. Funding for the early project phases is cost-shared 20% to 35 % with industry. This level of funding, based on program staff experience, is required to initiate these fundamental cost-reduction activities aimed at lowing the cost of manufacturing at low volumes.	0	0	640
Total, Distributed Power System Development.	3,550	5,300	6,700

Dispatchable Power System Development

■ **Cost Reduction** – Based on the results of industry's Trough Technology Roadmapping efforts in FY 1998, a number of component and system improvements were identified as being able to reduce the costs of near-term trough plants from the current $0.10 to $0.12/kWh to $0.06 to $0.08/kWh. To meet this need, the USA Trough Initiative was launched in FY 1999. FY 2000 work will focus on optimization of the collector design, improved system integration with conventional combined-cycle and heat-recovery plant layouts, and the evaluation of storage concepts. With appropriate R&D, these incremental improvements can collectively have a major impact on near-term costs. The USA Trough Initiative, which is heavily cost-shared by private industry, will provide a leading position for U.S. industry in bidding on international projects currently before the World Bank, with the potential to re-open a domestic market for trough systems. Additional activities include a SolMaT effort to develop low-cost drives and concentrators, and R&D for high-temperature system designs. Independent review boards, such as the President's Committee of Advisors on Science and Technology (PCAST), support this high-temperature work based on its potential of providing renewable power in the $0.04/kWh range. This level of funding, based on program staff experience and analysis of cost-sharing potential, is required to develop dispatchable systems capable of producing $0.06 to

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
$0.08/kWh power within five years, and prove their long-term potential for costs in the $0.04/kWh range.	1,700	1,130	3,320
■ **System Testing and Field Validation** – Work will include the field testing of the new parabolic trough concentrator designs. The decreased funding level is due to planned project completion and phase-out of direct Federal support for the Solar Two Project.	3,000	3,360	530
■ **Reliability and Lifetime Improvement** – The recent outstanding performance of some of the Solar Electric Generating System (SEGS) plants has been credited in large part to the O&M improvements achieved through the CSP program. Cost-shared technical support, tracking, and evaluation will be expanded to other sites. Special attention will be given to increasing the lifetime and maintainability of trough receiver tubes. In addition, the Solar Two evaluation and lessons learned document will be completed. This level of funding, based on program staff experience, is required to support the technology and O&M improvements necessary to guarantee the availability of reliable systems for use in near-term markets.	2,150	1,480	1,490
Total, Dispatchable Power System Development	6,850	5,970	5,340
Advanced Components and Systems Research			
■ **High Efficiency System Designs** – Activities include advanced research into high-efficiency system designs that will produce the long-term technological advances required for CSP to compete in both distributed and large-scale dispatchable power markets. Work will include advanced hybrid system designs, investigations of high-temperature working fluids and materials, and the expansion of advanced trough component research. Based on overall budget constraints, this level of funding is required to pursue the most critical technology advances that will drive costs down and move CSP technologies closer to becoming a viable option for U.S. industry to meet the demand for emission-free power.	2,698	1,780	1,800

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Field Operations & System Analysis** – Funding supports the development of advanced control systems, technology characterization updates, and system modeling. These funds also go to maintain the national laboratory facilities where much of the world-leading solar R&D is conducted. These efforts provide invaluable cost and technical data for each technology and serve as tools for project developers and researchers alike. This level of funding, based on program staff experience, is required to accomplish these tasks.....	469	1,410	1,860
■ **Concentrators** – Project work will focus on the development of advanced reflective materials, advanced drives, and concentrator structural design optimization, with applications for both distributed and dispatchable systems. Research will include the development of materials such as the revolutionary ultra-thin glass, which has the potential to greatly reduce the cost and improve the durability of the mirrors. This level of funding, based on program staff experience, is required to accomplish the critical component R&D that will be incorporated in the next generation systems.....	1,600	1,220	1,330
■ **Long-Term R&D** – Funding will support the advancement of several existing small projects from the design phase into the development of prototypes. These projects, including thermo-acoustic power and combined CSP and thermo-photovoltaic systems, have the potential to provide reliable distributed power options with the advantage of fewer moving parts, and an inroad into smaller residential markets where on-site power is in demand. This work will evolve to include activities such as heat-absorber materials, high temperature volumetric receivers, and advanced fuels and chemicals applications. The increased level of funding, based on program staff experience, is needed to carry these advanced concepts through the design phase and into working prototypes that get incorporated into advanced CSP systems capable of achieving costs in the $0.04 to $0.06/kWh range.....	350	580	970
Total, Advanced Component and System Research.....	5,117	4,990	5,960

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Strategic Alliances & Market Awareness			
■ This path covers technology transfer, communication activities, and makes the world renowned technical expertise of SunLab researchers available to U.S. industry, Federal and State legislators, and world organizations involved in renewable energy development. Analyses and studies will be conducted in FY 2000 to ensure that the CSP Program is focused on the needs of industry and the realities of the marketplace. Activities include the development of direct-normal insolation (DNI) maps, technology roadmaps, and web-based communications to make laboratory R&D more accessible to researchers. This level of funding, based on historical staff experience, is required to accomplish these tasks.	800	740	850
Total, Concentrating Solar Power Program	16,317	17,000	18,850

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 (000)
Distributed Power System Development	
■ Increased funding reflects an increase in the number of systems undergoing reliability and field testing as the USJVP, DECC, and Remote Power System projects move into their latter phases.	+1,400
Dispatchable Power System Development	
■ Reduced funding for Solar Two, since testing will be complete; offset to some extent by an increase in funding for the USA Trough Project to develop advanced trough components.	-630
Advanced Component and System Research	
■ Increase for reflective materials, concentrator structural design improvements, and advanced power conversion systems in order to meet long-term cost goals of $0.04 to $0.06/kWh.	+970

	FY 2000 vs. FY 1999 (000)
Strategic Alliances and Market Awareness	
■ Increase includes additional analysis of domestic markets in order to take advantage of restructuring opportunities.	+110
Total Funding Change, Concentrating Solar Power.	+1,850

Biomass/Biofuels Energy Systems - Power Systems

Mission Supporting Goals and Objectives

Program Mission

The Biomass Power Systems Program mission is to integrate sustainable biomass feedstock production with efficient biomass power generation to enable biopower to be a major cost-competitive contributor to power supplies in both domestic and international energy markets.

Program Goals and Objectives

By 2004, in collaboration with USDA, power producers, manufacturers, farmers, and foresters, the Biomass Program will have engaged in research and development activities to increase the viability of clean, efficient, biomass technologies for a variety of markets to achieve an additional 3,000MW of new biomass power capacity in the U.S., increasing the total to 10,000MW of domestic capacity. The program will benefit the American taxpayer by: helping to revitalize rural economies by providing jobs linked to renewable power production and co-products such as fuel, fiber, and feed; diverting biomass residues from the waste stream; and improving the environment in the near term through reduction in greenhouse gas emissions.

Significance of the Biomass Power Systems Program Goal to the Strategic Goal. Biomass Power Systems will be a major contributor toward meeting or exceeding the Solar and Renewable goal of doubling the renewable energy output by 2010. Biomass Power contributes to several of the objectives of the Energy Resources Strategic Goal in the DOE Strategic Plan.

Strategic Approach

Biomass is a local power solution with global benefits. The goal of the Biomass Power Systems Program is to develop and validate clean, efficient, renewable, biomass-based electricity generation technologies and operational systems with sustainable biomass supplies. We have three major energy technology thrust areas: 1) co-firing biomass with fossil fuels such as coal and natural gas, 2) small modular biomass power system and 3) advanced biomass gasification. We have begun a concentrated effort to demonstrate near-term benefits of modifying coal plants to allow 3% to 15 % of the fuel to come from biomass resources such as wood residues and from energy crops such as fast-growing willow trees. The Small Modular Systems Development Initiative will serve to bring viable biomass technologies into the global marketplace in the near term. Advanced gasification technologies are beginning to make a mark today, but will play a strong role in the longer-term. In addition, cost-competitive feedstock development and resource assessment are indispensable components of an integrated national biomass strategy. Increasing yield and decreasing production costs are critical to the penetration of biomass into the marketplace.

During the 20th century, our nation's economy has depended heavily on imported fossil fuels. Biomass —a renewable alternative—represents a tremendous, untapped, domestic resource for our energy future.

By investing in a bioenergy industry today, we can cultivate and harness these renewable resources to fuel our cars, power our homes and industries, and supply our chemical needs in the 21st century. The Department of Energy, along with other federal agencies and private partners, is launching a national partnership to develop an integrated industry to produce power, fuels, and chemicals from crops, trees, and wastes. By making a "ton of biomass" a viable market competitor to a barrel of oil or a railroad car of coal, this initiative will help grow the U.S. economy, strengthen U.S. energy security, protect the environment, and revitalize rural America. This effort will integrate the work from existing DOE R&D in transportation biofuels, biomass power and the Forest Products and Agriculture Industries of the Future programs to enable technologies that produce different combinations of fuels, power, chemicals and other products from different feedstocks in different areas of the country. It is only through the integration of these efforts that biomass will be an effective competitor to imported fossil fuels.

The program is expanding its focus to include a full complement of efficient biomass technologies, size ranges, and feedstocks (agricultural residues, wood residues, energy crops, etc.). The program is working to balance the research and demonstration efforts to most effectively advance the technology. Toward this goal, we are asking for increased support for thermochemical conversion research over the five-year period as we maintain support for large demonstration projects. We think that additional simulations and performance modeling in the laboratory will allow us to save time and money during field demonstration projects. To take advantage of additional feedstocks, we are beginning the Cooperative Agricultural Residues to Energy Initiative aimed at pairing animal producers, local energy producers (such as electric cooperatives), and state health, environmental and energy officials to develop projects which use animal manure or litter to produce power, making productive use of an environmental hazard. Increased focus on feedstock production, processing and handling is also necessary to advance biomass energy technology.

We remain committed to forging partnerships with other Federal agencies, communities, power generators, manufacturers, farmers and foresters to fully demonstrate sustainability of clean, renewable, biomass power. Although several of the technologies are nearing commercial viability, the Federal dollars help to reduce the risk that pioneer developers and power producers experience when initially using a new technology. Without the encouragement and support of the Biomass Power Systems Program, it's unlikely that clean and efficient biomass power would be produced in significant quantities.

Program Benefits

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Qdads)	0.03	0.42	0.53
Energy Savings ($ Billions)	0.00	-0.15	-0.21
Carbon Displaced (MMTCE)	0.62	10.49	12.95

The primary energy displaced in 2010 will be enough to power 5.2 million U.S. homes, and 9.0 million homes in 2020.

The carbon reductions achieved are equivalent to removing 2.5 million vehicles from U.S. highways by 2010, and 11 million vehicles by 2020 (8% of today's total U.S. vehicles).

Performance Measures

FY 2000 Performance Measures

- Develop successful quantitative modeling tools to assist industry increase use of combustion and cofiring of biomass fuels and coal.
- The Biomass Power Systems Program will successfully complete engineering, installation and commissioning of the catalytic gas conditioning and compression system at Vermont's biomass gasification facility through partnerships with the private sector. Long-term operational testing of the gasifier will provide the forest products industry with performance data for implementation of these systems in that sector.
- Successful completion of the NIPSCO Bailly Cofiring demonstration will facilitate diffusion of biomass and coal cofiring throughout the industry.
- Assist the private sector in the selection of high-yield hybrid poplar clones and the production of cuttings (millions) for commercial planting.

FY 2001 - 2006 Performance Measures

- Complete successful demonstration of the benefits of integrated gasification combined cycle in Vermont which will have applications to the Forest Products and other industries as they implement capital replacement projects with advanced gasification technology power houses.
- Complete demonstration of prototype units for three high efficiency and low emissions small biomass gasification (or combustion) concepts integrated with modular power generating systems. These systems will be ready for diffusion and dissemination at national and international levels.
- Develop and demonstrate high yield short rotation plants and grasses for biomass power uses. For instance, successful high yield varieties of willows, poplars, and switchgrasses. In excess of 5,000 new acres of different high-yielding varieties will be planted by the private sector and used in power applications.
- Generate 2 GWe (0.05 Quads/y) from biomass and coal cofiring offsetting 4 million metric tons of fossil carbon per year.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- Conducted critical and pioneering applied research, pilot testing, and feasibility studies in the areas of biomass combustion and biomass gasification, which provided the foundation for advanced and improved technology development. Examples include:

- Successfully reduced alkali metals in pyrolysis oils using fundamental understanding of alkali behavior gained from basic laboratory research and field measurements.
- Developed industry guidelines for direct combustion of high alkali biomass feedstocks.
- Successfully operated a small (200kW) gas turbine with biomass synthesis gas.
- Pioneering studies on overall emissions of biomass-based power systems that demonstrated "carbon closure."

FY 1998 Accomplishments

- Successfully demonstrated sustained operation of the Battelle/FERCO advanced biomass gasifier in Burlington, Vermont, at the McNeil Biomass Power Station.
- Initiate co-firing demonstrations with modifications started at two power stations.
- Completed feasibility studies for ten diverse small modular systems.

FY 1999 Planned Accomplishments

- Complete design and site preparation to begin gasifier construction in Minnesota for the MnVAP Biomass Power for Rural Development project.
- Complete design of power plants modifications for co-firing of Biomass with coal activities.
- Solicited and selected small modular systems for testing and demonstrations.
- Development of a technology roadmap for bioenergy technologies.

FY 2000 Planned Accomplishments

- Successfully demonstrate sustained operation of the total Vermont biomass system (gasifier, gas clean up, and advanced biogas turbine).
- Complete the power plant retrofit for co-firing switchgrass with coal in Iowa for the Chariton Valley Biomass Power for Rural Development project.
- Complete three projects which will be co-firing with biomass on a regular basis.
- Complete testing of two to three small modular systems.
- Complete resource database for biomass crops and residues.
- Complete laboratory testing of a fuel cell and 2 types of engines coupled with the lab-scale biomass gasifier.

FY 2001 - 2006 Planned Accomplishments

- Complete demonstration of two to three of the most promising Small Modular Systems Initiative projects.
- Complete the development of 2 high-yield woody biomass crop clones and release them to nurseries.
- Complete the Small Modular Systems Initiative with two to three small-scale biomass systems poised for rapid commercialization by the private sector.

- Complete all three Biomass Power for Rural Development projects with more than 100MW of new biomass power generating capacity.
- Complete development of 3 high-yield willow clones which increase yields by at least 20%.
- Complete the Co-firing Initiative with new facilities that were in the partnership. Facilities are co-firing biomass on a regular basis.
- Operate five or more successful demonstration projects with animal manure as a fuel for electricity production as part of the Cooperative Agricultural Residues to Energy Initiative.

Program Completion

Completion of the program is anticipated to be in 2008, depending on the state of adoption of the technology. Modest support for research and development to further increase efficiency and decrease emissions from biomass power plants may be important beyond this time frame.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Thermochemical Conversion	1,500	1,550	2,700	+1,150	+74.2%
Systems Development	21,017	26,350	32,150	+5,800	+22.0%
ATS/Biomass for Cogeneration	2,564	0	0	0	0.0%
Feedstock Development	1,723	2,300	3,100	+800	+34.8%
Regional Biomass Energy Program	985	1,250	1,000	-250	-20.0%
Total, Biomass/Biofuels Energy Systems - Power Systems	27,789	31,450	38,950	+7,500	+23.8%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Thermochemical Conversion

- **System Integration Research** - This funding supports research on gas treatment/cleanup options to power highly

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
efficient, environmentally-benign small power systems which are needed in national and domestic markets. It also supports various demonstration efforts (e.g., Vermont gasifier) identified as critical to industry. The focus of this phase is the development of performance parameters for integrated gasification power producing systems. This funding level is based on sustaining a multi-year program as it moves into the testing phase at NREL Thermochemical User Facility. Thermochemical conversion research is the foundation of the Biomass Power Program and plays a key role in providing data for critical planning and decision-making processes. Efficient and cost-effective analysis produced in a laboratory setting enables the program to make sound decisions on technology prior to field demonstration and validation.	880	900	1,400
■ **Co-firing/Ash Deposition** - This effort conducts research to minimize problems related to the high alkali metal contents of many biomass fuels which can lead to fouling, slagging, and corrosion in conventional biomass furnaces and boilers, and in pulverized fuel utility boilers cofiring biomass and coal. Funding levels increase is to incorporate results from research on formation, evolution and reaction of chemical compounds in gasification and combustion environments into databases and models. This effort conducts research to minimize problems related to the high alkali metal contents of many biomass fuels which can lead to fouling, slagging, and corrosion in conventional biomass furnaces and boilers, and in pulverized fuel utility boilers cofiring biomass and coal. These research results are directly linked to the Department's performance measure for co-firing.	350	350	500
■ **Systems Analysis and Modeling** - The impact of a restructuring environment on technology development needs to be assessed. The level of NOx emissions will be modeled and verified. This activity leads to maximizing pollution reduction and minimizing the need for incentives.	270	300	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Capital Equipment** - Gas cleaning integration modules, conversion devices, and analytical equipment will be purchased in support of systems integration research. This equipment is essential to the laboratory as accuracy and precision in research are afforded by having up-to-date equipment.	0	0	200
Total, Thermochemical Conversion.	1,500	1,550	2,700
Systems Development			
■ Hawaii Gasification Project completion and close out.	600	0	0
■ The Vermont Gasifier Project will demonstrate a pilot-scale state-of-the-art gasifier combined with an advanced turbine, producing approximately 8-12MW of electricity from wood. Gasification vessel completed and tested (FY 1998). A hot-gas clean up unit will be installed and the integrated combined cycle gasification system will be operated for 1,000 hours at double the efficiency of direct-fired biomass units (FY 2000).	1,550	3,000	5,500
■ The three (3) Biomass Power for Rural Development Projects constitute a Presidential Initiative which began in 1996 that will demonstrate the sustainability of closed-loop energy crops. Specific program objectives include: 1) facilitate the transition from the use of residues to the integrated use of dedicated energy crops and residues; 2) facilitate the expansion of agriculture and its related infrastructure for large-scale energy crop production; and 3) invest in the stewardship of our air, water, and soil resource to produce electricity, goods, and services. It is predicted that by FY 2020, over 10 million acres of energy crops could be in place, supporting over 260,000 U.S. jobs.			
▸ Minnesota Valley Alfalfa Producers - The Minnesota 75 MW gasifier is fueled with alfalfa stems. This project demonstrates a modern biomass power system that will use alfalfa stems for 75 MW of electric power production			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

and will market the co-product of alfalfa leaves as animal feed. With the completion of the Engineering Design in FY 1999, construction begins in FY 2000. The funding level represents the DOE cost share. Funds are requested for the project to fulfill DOE commitments to the Minnesota Valley Alfalfa Producers (MnVAP) who have signed a power purchase agreement with Northern States Power. The plant is scheduled to open in 2001. Funds will ensure that this date is met.

- New York Willow Co-firing - The project is demonstrating and quantifying the environmental and economic benefits of cofiring willow and coal in existing power plants with several companies and farmer groups. In the year 2000, up to 600 acres of willow will be planted. Testing of cofiring willow and coal will be conducted and completion of retrofit of two additional coal plants. Funds are required to complete the planned effort in the year 2000. This will enable the timely completion of DOE commitments to the Salix Consortium.

- Iowa Switchgrass Co-firing - The project is working to establish switchgrass to generate up to 35MW of power by cofiring with coal. In the year 2000, up to 3600 acres of switchgrass will be planted. Retrofitted plant testing will begin. These funds will enable the timely completion of DOE commitments to the Chariton Valley Resource Conservation and Development, Inc.

  In the year 2000, these three projects will be in advanced stages of construction, planting, and testing at various facilities which require substantial government cost share. The level of funding is based on the scope of work as described above. 17,367 15,450 17,250

- **Co-firing Biomass with Coal Initiative** - Extensive testing and trials have shown that biomass can replace up to 15% of the total energy input in existing coal power plants, thus allowing a direct opportunity for carbon mitigation (an estimated 16-24 million metric tons of carbon in 2010), which

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
has been identified as the most cost-effective method of carbon mitigation for utilities. Biomass co-firing also reduces SOx, and potentially, NOx emissions. The DOE initiative will focus on increasing power producer knowledge and confidence through a series of cost-shared co-firing demonstrations in power plants. This initiative will work towards increasing co-firing capacity. In FY 2000, baseline data developed from retrofitting and testing activities at the four established sites will be used to extend the scope of the co-firing initiative to additional sites and to demonstrate sustained operations at selected sites. These research results are directly linked to the Department's performance measure for co-firing.	0	2,500	5,400
■ **Small Modular Systems Development** - Initiated 2-3 Phase II development projects and began implementation of projects. These funds will also bring to completion the DOE commitment to the previously awarded ten contracts to the developers of modular systems. Federal support is required to bring to commercial market readiness of biomass-based generation systems that will provide power in the range of electrical generation sizes of 5 kW to 5 MW for domestic and international markets. The development of these systems will be cost-shared. Funding is being provided for feasibility studies, prototype demonstration, and proceeding to full system integration and development of fully mature business strategies. Current global markets projections for these systems are in the range of 40 GW with an annual growth projection 4 percent per year. Increased funding is needed for the testing and demonstration of promising innovative prototype systems.	1,500	2,000	4,000
■ $750,000 is being allocated for the Plumas county ethanol project. The program is currently waiting contact by Plumas county. $1,000,000 is being provided for the demonstration of black liquor gasification; a competitive solicitation process will be conducted with an award being anticipated for the 3rd quarter of FY 2000. $300,000 for the Vermont methane energy production project has been forwarded to the Vermont			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
State Energy Office. $100,000 is being provided to evaluate the amount, distribution, and best method of extraction and utilization of methane gas from Sunrise Mountain Landfill in Nevada. Funds have been sent to the Nevada State Energy Office. $1,250,000 in funding for the Consortium of Plant Biotechnology has been forwarded to this organization.	0	3,400	0
Total, Systems Development.	21,017	26,350	32,150
ATS/Biomass for Cogeneration			
■ Developed advanced materials/coatings to protect turbine components from oxidation and corrosion.	2,564	0	0
Feedstock Development			
■ Feedstock production is critical to the concept of biomass energy systems. Providing economic and environmentally sustainable feedstocks through this effort will help to ensure that investments in conversion systems continue due to the assurance of adequate raw materials supply for biomass facilities. Conduct genetic, physiological, breeding and management techniques research to improve yield of selected grasses.	700	900	900
■ Conduct genetic, physiological, breeding and management techniques research to improve yield of willow and other selected short-rotation woody crops.	623	700	1,200
■ Develop harvesting, storage, handling and power feeding techniques to improve efficiency and reduce operation cost.	0	300	500
■ Develop and maintain national feedstock database; assess biomass feedstock availability for specific biomass technologies; and analyze national economic and environmental impacts of feedstock utilization.	400	400	500
Total, Feedstock Production.	1,723	2,300	3,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Regional Biomass Energy Program			
■ The Regional Biomass Energy Program serves as the technology transfer arm of the Biomass Power program and is essential to establishing activities between state government and the private sector.	985	1,250	1,000
Total, Biomass/Biofuels Energy Systems-Power Systems.	27,789	31,450	38,950

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Thermochemical Conversion	
■ This increase is necessary to continue critical basic research in biomass combustion and gasification characteristics, especially relating to cofiring biomass with coal (a major near-term, low-cost market opportunity) and as applied to integrated gasification power producing systems. Funding level increase to incorporate results from research on formation evolution and reaction of chemical compounds in gasification and combustion environments into databases and models.	+1,150
Systems Development	
■ This increase is primarily to support the projects undertaken in the construction and testing of Biomass Power for Rural Development Initiative ($1,800,000) and the Vermont gasification systems ($2,500,000), the development of new small-modular biopower systems ($2,000,000), and includes the support of cost-shared utility scale cofiring demonstrations ($2,900,000), and the inclusion of earmarks in FY 1999 (-$3,400,000).	+5,800
ATS/Biomass for Cogeneration	
■ No change.	0

	FY 2000 vs. FY 1999 ($000)
Feedstock Development	
■ This program will require additional funding for testing of promising new hybrids developed by the program for grasses and Short Rotation Woody Crops specifically for biopower applications.	+800
Regional Biomass Energy Program	
■ The decrease in funding is based on the program's use of the existing infrastructure to deploy biomass technologies through cost-shared grants and activities with State energy offices and Federal and regional organizations.	-250
Total Funding Change, Biomass/Biofuels Energy Systems - Power Systems.	+7,500

Biomass/Biofuels Energy Systems–Transportation

Mission Supporting Goals and Objectives

Program Mission

The mission of the Biofuels Energy System–Transportation program, managed by the Office of Energy Efficiency and Renewable Energy's Office of Transportation Technologies, is to research, develop, and demonstrate cost competitive technologies for the production of liquid transportation fuels, in collaboration and partnership with industry, other government organizations, academic institutions, and others. In support of this mission, the program pursues the development of low-cost biomass energy feedstocks and cost competitive, highly efficient conversion technologies for liquid fuels production from cellulosic methods. Biomass feedstocks include agricultural residues (e.g., rice straw/husks, bagasse), forest wastes/residues, (e.g., sawdust, thinnings), and energy crops, i.e., trees and grasses grown specifically for use as energy feedstocks. Based on its near-term potential, the program focuses on the production of ethanol.

Program Goals and Objectives

For the ethanol program, production cost goals have been established. The goals provide the direction for the research and development activities supported by the program. By the year 2000, the goal is to demonstrate technologies, in partnership with industry, that are capable of producing ethanol at a cost of $1.13 per gallon (1996 dollars). This goal applies to green field facilities, although most of the demonstration projects currently under consideration are retrofits of existing facilities or add-ons to biomass power facilities, which significantly lowers the capital investment costs and results in an estimated ethanol production cost of $0.70 to $0.90. Currently, three highly leveraged partnerships to build ethanol demonstration facilities have been established. Each of these facilities is being financed with an 80 percent or higher private sector investment and a 20 percent or less DOE cost share. Additional partnerships will be established that will ultimately lead to the design and construction of cellulose-to-ethanol facilities. By the year 2004, at least three ethanol facilities will be in operation using biomass wastes, and a partnership with the corn ethanol industry will complete pilot-scale testing on ethanol production from corn stover. These partnerships are essential components for achieving our programmatic goals in a cost-effective manner.

Also in partnership with industry, the goal by the year 2005 is to demonstrate technologies capable of economically producing ethanol from energy crops, such as switchgrass. Since energy crop technologies complement various end use applications, funds are requested by both Biomass/Biofuels Energy Systems-Transportation ($5,500,000) and Biomass/Biofuels Energy Systems-Power Systems ($3,100,000). Under Biofuels Energy Systems the intent is to develop and demonstrate technologies capable of producing ethanol at a cost of $0.72 per gallon by the year 2010. To accomplish the program's cost goals and proceed beyond the first demonstration facilities, research, development and demonstration activities are conducted in accordance with integrated biomass feedstock and conversion systems. Energy cropping systems using the best varieties and management practices must be developed through breeding and reliable field testing in the different growing regions in the United States across a

wide range of sites and conditions. Once developed, these cropping systems will be capable of providing reliable biomass feedstock supplies for the production of fuels, chemicals, and electricity. Recent success with integrated crop systems in the Northwest obtained biomass production levels of over five times that of natural systems and serves as a model to develop the technology nationwide. Clones developed through DOE-funded research have led to the commercial deployment of 60,000 acres in the Northwest.

Specific areas within the conversion process (conversion of feedstocks to products such as ethanol) have been identified which offer the most significant opportunities for efficiency improvements and cost reductions. These areas include improvements in enzyme production and efficiency (so that less enzyme is needed), pretreatment methods that prepare the biomass for conversion to ethanol, and fermentation organisms to convert the range of sugars that can be found in the differing types of biomass materials. The program will also evaluate potential cost reductions based on possible co-products, including electricity and industrial chemicals. Biomass/Biofuels Energy Systems-Transportation and Biomass/Biofuels Energy Systems-Power Systems are conducting analyses of biomass resource availability in a coordinated fashion. Most of the research and development activities for feedstock and conversion improvements are conducted through the Department's national laboratories, using in-house capabilities, subcontracted researchers and facilities at universities, other government agencies such as the United States Department of Agriculture, and industrial scientists with the best expertise and experience.

The Biofuels Energy Systems-Transportation program is also exploring opportunities to produce renewable fuels for heavy vehicle use by supporting biodiesel production activities. These activities include research to lower the costs of biodiesel and the testing and development of new fuel formulations for heavy vehicle use. Niche opportunities for biodiesel are available in environmentally sensitive areas, such as underground mining, marine, and fragile ecosystems (e.g., National Parks). Diethyl ether (DEE) made from ethanol is a fuel that will also be evaluated for its application to heavy vehicle use. DEE's high cetane number and other fuel properties make it particularly attractive for heavy vehicle application.

The Regional Biomass Energy Program (RBEP), funded as a part of this Biofuels Energy Systems-Transportation program (with an additional $1,000,000 being requested by the Biomass Power program in the Office of Power Technologies) plays a significant role in technology deployment. RBEP, through its local and regional contacts, transfers current and reliable information on biomass development activities to potential users. This includes economic and technical information, as well as State and local regulatory, environmental, and market considerations for the production of fuels, chemicals, and electricity. Existing organizations, such as the Coalition of Northeastern Governors, Council of Great Lakes Governors, the DOE Atlanta Regional Support Office, the DOE Seattle Regional Support Office, and the DOE Denver Regional Support Office, serve as RBEP hosts and contacts for their respective regions in the United States.

Strategic Approach

During the 20th century, our nation's economy has depended heavily on imported fossil fuels. Biomass — a renewable alternative — represents a tremendous, untapped, domestic resource for our energy

By investing in a bioenergy industry today, we can cultivate and harness these renewable resources to fuel our cars, power our homes and industries, and supply our chemical needs in the 21st century. The Department of Energy, along with other federal agencies and private partners, is launching a national partnership to develop an integrated industry to produce power, fuels, and chemicals from crops, trees, and wastes. By making a "ton of biomass" a viable market competitor to a barrel of oil or a railroad car of coal, this initiative will help grow the U.S. economy, strengthen U.S. energy security, protect the environment, and revitalize rural America. This effort will integrate the work from existing DOE R&D in transportation biofuels, biomass power and the Forest Products and Agriculture Industries of the Future programs to enable technologies that produce different combinations of fuels, power, chemicals and other products from different feedstocks in different areas of the country. It is only through the integration of these efforts that biomass will be an effective competitor to imported fossil fuels.

A strong Biofuels program is consistent with the recommendations by many internal and external studies that have examined various DOE programs. For example, the PCAST report, and reports on actions to reduce global warming omissions, recommend increased funding for biofuels on the basis that biofuels constitute the most promising and reasonable supply-side alternative for reducing carbon emissions in the transportation sector.

The Comprehensive National Energy Strategy also encourages the deployment and development of advanced biofuels technologies to diversify our energy options, promote domestic rural economic development, and reduce carbon emissions in the transportation sector. A strategy cited DOE's Strategic Plan states, "In FY 2000, startup of a demonstration facility that converts low-cost waste biomass into ethanol at a production cost of $1.13 per gallon (1996 dollars) compared to $1.22 per gallon in 1996." The Office of Transportation Technologies' Strategic Plan identifies a biofuels milestone in 2001 as "pilot demonstration (of ethanol production) with wastes." The Biofuels Energy Systems-Transportation goals and strategies are consistent with the various levels of DOE strategic planning.

Program Benefits

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.36	1.00
Energy Savings ($ Billions)	0.00	0.00	0.07
Carbon Displaced (MMTCE)	0.00	6.70	19.00
Oil Displacement (million barrels per day)	0.00	0.20	0.50

Performance Measures

FY 2000 Performance Measures

- Establish economic feasibility of enzymatic conversion of cellulose to ethanol (on site *Trichoderma reesei* production) at the bench scale.

- Select partner to demonstrate enzymatic conversion of cellulose to ethanol as an add-on to corn-to-ethanol facility.
- Establish partnership with equipment manufacturers and other groups for R&D of harvesting, handling, and storage alternatives for switchgrass.
- Ethanol production cost competitive in the oxygenate market for acid hydrolysis plants with shared infrastructure (e.g., colocated with biomass power plants) and with access to biomass feedstocks at less than $5 per dry ton.

FY 2001 - 2006 Performance Measures

- Select enzyme manufacturing partner to develop advanced cellulase enzyme system. (2001)
- In partnership with USDA, complete development of integrated equilibrium economics model for energy crops. (2002)
- Ethanol production cost competitive in the oxygenate market for acid hydrolysis plants with shared infrastructure (e.g., colocated with biomass power plants) and with access to biomass feedstocks at less than $10 per dry ton. (2003)
- Demonstrate 3-fold improvement (from 1998 base) of cellulase enzyme activity. (2004)
- Ethanol production cost competitive in the oxygenate market for enzyme hydrolysis plants with shared infrastructure (e.g., colocated with biomass power plants or corn ethanol plants) and with access to biomass feedstocks at less than $15 per dry ton. (2006)
- Begin development of enzymatic conversion technologies with appropriate industry partners. (2002)
- In partnership with USDA, complete development of integrated equilibrium economics model for energy crops. (2002)
- Begin commercial demonstration of softwoods to ethanol and electricity. (2003)
- Complete pilot testing of countercurrent pretreatment reactor with industry. (2003)
- Demonstrate 3-fold improvement (from 1998 base) of cellulase enzyme activity. (2004)
- Conduct pilot testing with ethanol partner for energy crop conversion. (2004)
- Begin small commercial scale demonstration of enzymatic process in collaboration with a corn-ethanol producer. (2005)
- Demonstrate first-of-a-kind switchgrass conversion to ethanol at a production plant. (2005)
- Demonstrate improved enzymatic hydrolysis technology at the pilot scale. (2006)

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- Received the prestigious R&D 100 award for developing *Zymomonas mobilis*, a fermentation organism capable of converting 30% of available sugars to ethanol. (1995)

- Successfully operated the process development unit in an integrated continuous mode with an industry partner at the National Renewable Energy Laboratory's Alternative Fuels User Facility. (1996)
- Developed hybrid poplar clones in the feedstock development activity which have been planted commercially by industry on over 75,000 acres in the Pacific Northwest. (1997)
- Established a partnership with BC International for the first domestic biomass ethanol production facility in Louisiana. (1997)

FY 1998 Accomplishments

- Completed bench-scale development and formed partnership for converting softwoods to ethanol using dilute acid hydrolysis.
- Expanded switchgrass breeding activities and initiated a 20-acre research test to validate the yield and cost of switchgrass production.
- Collaborated with biomass power program to initiate a large scale switchgrass planting activity.
- Completed bench- and pilot-scale testing of converting sugar cane bagasse to ethanol.
- Completed separate competitive solicitations to develop advanced enzymes, to produce the next generation fermentation organisms, and to conduct bioethanol feasibility studies at corn-to-ethanol plants.

FY 1999 Planned Accomplishments

- Complete at least one feasibility study of corn-add-on facility for the conversion of cellulosic feedstocks.
- Establish partnership with timber industry, United States Forest Service, and local communities to evaluate environmental and social effects of watershed forest management to suppress forest fires through production of ethanol and electricity using forest thinning.
- Complete bench scale testing of rice straw conversion to ethanol.

FY 2000 Planned Accomplishments

- Successfully demonstrate conversion of agricultural waste to ethanol at a small commercial scale using a genetically engineered organism.
- Successfully demonstrated concentrated acid conversion of rice straw at a small commercial scale, integrated with byproduct recovery.
- Complete engineering feasibility of softwood feedstocks representative of Alaska, in collaboration with industry partners.
- Release new improved hybrid poplar clones for public use.

FY 2001 - 2004 Planned Accomplishments

- Complete pilot scale R&D of rice straw conversion to ethanol and electricity. (2001)

- Start up municipal solid waste-to-ethanol plant. (2001)
- Complete pilot scale R&D of softwood conversion to ethanol and electricity. (2002)
- Complete pilot scale testing of conversion technologies in cooperation with corn ethanol industry. (2003)
- Complete pilot testing of advanced fermentation organism with ethanol partner for energy crop conversion. (2004)

Program Completion

The program is anticipated to be completed in 2015, depending on the state of adoption of the technology. Modest support for research and development to further increase process efficiencies and reduce costs of producing biofuels from energy crops for transportation purposes may be required beyond this time frame.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Ethanol Production	25,027	35,950	37,441	1,491	4.1%
Biodiesel Production	800	750	1,000	250	33.3%
Feedstock Production	2,500	2,800	5,500	2,700	96.4%
Regional Biomass Energy Program	2,000	2,250	3,500	1,250	55.6%
Integrated Bioenergy Research and Development	0	0	6,000	6,000	>999.9%
Total, Biomass/Biofuels Energy Systems - Transportation	30,327	41,750	53,441	11,691	28.0%

Detailed Program Justification

(dollars in thousands)

FY1998	FY 1999	FY 2000

Ethanol Production

- **Advanced Fermentation Organisms R&D** - Research and development of advanced fermentation organisms to improve conversion process efficiency, including the development of *Zymomonas mobilis* with enhanced capabilities (FY 1998) and the development of organisms with increased stability, robustness, and ability to ferment mixed sugars from waste

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
feedstocks and the model energy crop switchgrass (FY 1999) to improve process efficiency and lower the cost of ethanol production from biomass.			
■ Testing of these strains at pilot scale and small scale commercial facilities will be completed to demonstrate reliable performance of these first generation organisms. Research and development of advanced (second generation) organisms, such as *Lactobacillus*, that can ferment additional biomass feedstocks with greater efficiencies will provide further cost reductions and the potential for expanding biomass ethanol applications. This funding level is considered appropriate based on extensive experience with laboratory and pilot scale operations and personnel costs.	1,960	2,200	3,000
■ **Advanced Cellulase R&D** - Analyses indicate that the production of ethanol, using enzymes for the breakdown of biomass materials to sugars for fermentation, is limited to a great degree by the high cost of enzymes. Research and development partnerships with enzyme producers will be established to provide more productive, lower cost cellulase systems. Collaborations with enzyme and biomass ethanol producers will be developed to accelerate the use of commercially-available cellulase systems. The funding level was determined based on cellulase colloquys with industrial experts and potential cost-sharing and program reviews..	2,455	4,547	5,500
■ **Pretreatment R&D** - Physical and/or chemical pretreatment of biomass facilitates enzyme and fermentation reactions, thereby improving process efficiency and lowering costs. An advanced pretreatment reactor, the countercurrent pretreatment reactor, was designed, fabricated and delivered to the National Renewable Energy Laboratory process development unit in FY 1998. In FY 1999, focus is on installation of the reactor system. In addition, bench scale testing of more cost-effective pretreatment technology options, with assessment of for softwoods feedstocks potential chemical co-products, will improve process economics of producing ethanol from forest thinnings.			

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
■ In FY 2000, shakedown and testing of the countercurrent reactor system will be completed and an industrial partnership will be established for commercial demonstration of pretreatment technology. Funding level is considered appropriate based on experience with operations and personnel costs and cost-sharing by industry partner.	1,960	2,800	5,508
■ **Consortium for Plant Biotechnology Research** - Seventeen grants were competitively awarded to University members in FY 1998 and fifteen awards were made in FY 1999 for basic research. The 50:50 cost-shared, long term R&D projects with The Consortium for Plant Biotechnology Research, Inc., (CPBR) for peer-reviewed, basic university research will not be continued in order to focus on more applied research activities that support program goals and objectives.	2,455	1,250	0
■ **Integrated Process Development** - In FY 1999, integrated bench-scale studies will evaluate the overall process and performance of softwood thinnings from private and public forests, including National Forests, in cooperation with industrial partners. Technologies for the coproduction of ethanol and high value products will be researched and developed by the Michigan Biotechnology Institute (MBI). DOE will provide $3,000,000 to MBI, in accordance with Congressional guidance.			
■ Integrated bench-scale and pilot-scale testing of the overall process (handling, pretreatment, fermentation) will evaluate performance, efficiency, and costs for conversion of agricultural waste feedstocks, such as rice straw. Softwood feedstocks, such as thinnings from private and public forests, will be tested at the NREL Biofuels User Facility/Process Development Unit, in support of commercial partners considering the production of ethanol and integrated co-products. Analytical studies will assess the process economic goals. The development of coproducts and by-product utilization will continue to provide a means for expanded technology demonstrations and lower ethanol production costs. Funding is considered appropriate based on standard cost-estimating practices implemented and validated at the laboratory (operations and personnel costs).	8,265	11,500	11,500

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
■ **Feasibility Studies** - Several cost shared feasibility studies were completed in FY 1998. Feasibility studies are an integral part of assessing the technical and economic viability of individual ethanol production facilities. Therefore they will be continued under the activity Cellulose-to-Ethanol Production Facilities, in FY 1999 and FY 2000.	841	0	0
■ **Cellulose-to-Ethanol Production Facilities** - Laying the groundwork for a broad-based cellulosic biomass-to-ethanol industry, cost-shared partnerships to design and construct ethanol production facilities are being developed. In FY 1998, an additional commitment to design and construct biomass waste-to-ethanol facilities was obtained. DOE's commitment for the BC International (BCI) project, initiated in FY 1997, was $4,000,000, with BCI cost-share of $27,600,000, or 87%. An additional $750,000 was included under Biomass Power for the Gridley, California project. A minimum 50% cost share was required from any partner entering into an agreement.			
■ In FY 1999, DOE's commitment with BCI for the Jennings, Louisiana plant will be completed, in accordance with Congressional guidance. An additional commitment with an industrial partner will be established, leading to the design and construction of an ethanol facility in Rio Linda, California. DOE share for the Rio Linda facility is $4,000,000, in accordance with Congressional guidance. An additional commitment with industry partners will be established, leading to the design and construction of commercial demonstration facilities in targeted areas of California and Alaska.			
■ In FY 2000, support of commitments established in fiscal years 1998 and 1999 will continue. Softwood pilot scale testing will accelerate deployment through continued support of integrated bench-scale enzymatic hydrolysis testing. Partnerships will be developed to demonstrate enzymatic conversion of cellulosic biomass to ethanol in support of the corn ethanol industry. Partnerships will also be established to demonstrate coproduction of ethanol at coal-fired power stations. Funding level is considered appropriate, providing minimum cost-share in some cases (20%) by DOE and are based on prior experience with these types of partnerships.	7,091	13,653	11,933
Total, Ethanol Production	25,027	35,950	37,441

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
Biodiesel Production			
■ **Biodiesel Production Technologies** - Based on a technoeconomic assessment, research and development will improve biodiesel process technology, using waste grease streams to lower production costs. In addition, improved oilseed production research and development will be conducted to lower biodiesel production costs. Working with industry, activities to facilitate market penetration will continue that will lead to increased biodiesel production and use. Funding level is considered appropriate and depends on cost-sharing to be successful. Research and development based on work involved and personnel requirements.	600	750	1,000
■ **Waste Oil Assessment** - An evaluation of the quantity, availability, and potential of waste oils as a transportation fuel was completed.	200	0	0
Total, Biodiesel Production.	800	750	1,000
Feedstock Production			
■ **Biomass Feedstock Development Centers** - Research will be conducted to develop economically viable model energy crops at integrated biomass feedstock development centers in the Pacific Northwest (poplars), Southeast (switchgrass), Midwest/Plains States (switchgrass and poplars) and Northeast/Lake States (willow). At these centers, breeding to select for higher yields and other desirable traits is linked closely with studies on management, physiology, growth-limiting factors, and advanced biotechnology. Field studies to evaluate nutrient effects on carbon sequestration and storage will be added to provide additional vital information on energy crops. Funding level determined from prior experience with work involved and makes use of experts at universities and U.S. Department of Agriculture over four regions of the U.S.	1,600	1,600	4,000

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
■ **Environmental Effects of Energy Crop Deployment** - Research to evaluate the effects of large scale deployment of energy crops on the environment, such as water and soil quality, chemical fates, and biodiversity will provide credible data that can be used to guide deployment in a manner that ensures energy and environmental benefits. Funding level is considered appropriate based on the level of effort which makes use of existing field sites.	400	225	225
■ **Energy Crop Seedling/Planting Stock Selection Research** - Advanced biotechnology and other methods will develop techniques that can be used to select energy crop seedlings or other planting stocks that are less susceptible to disease and/or pests, reducing the risk of mortality and increasing technical/economic viability. Desirable genotypes of switchgrass will be selected, propagated, and transferred to greenhouse/field tests to verify the selection process. Funding level is based on level of effort for this university project.	100	100	100
■ **Large Scale Woody Crop Plantation Research** - Research will be conducted to develop and evaluate management techniques to overcome the water use efficiency constraints in the Southeast. Technical assistance and cost sharing will be provided for existing large scale plantings in the Midwest/North Central region to obtain performance and cost data. Funding level was determined from level of effort needed to provide technical assistance by a laboratory expert for these large scale plantings and low level cost share.	150	125	125
■ **Switchgrass Variety Testing and Scale-up Research** - Switchgrass variety field tests are being conducted in the major growing regions of the U.S. Field trials established at five USDA National Plant Materials Testing Centers will evaluate newly developed switchgrass lines. Cost-shared 100-300 acre scale-up plantings of switchgrass will be evaluated to provide yield, operational issues, and cost data. Field tests and scale-up data will be collected and evaluated and field trials near waste-to-ethanol facilities/sites will be established. Funding level is considered appropriate based on level of effort, work scope and use of university and U.S. Department of Agriculture expertise and facilities.	200	500	500

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
■ **Feedstock Composition and Multi Product Use** - Altering plant composition to improve conversion efficiencies will provide potential benefits and cost reductions in the production of fuels, chemicals and electricity. The tailoring of plants so that all components of the plant can effectively be used to produce multiple products will provide potential cost reductions and broader opportunities for adaptation of feedstock production systems. Plant biotechnology research will be initiated, based on co-product potentials and strategies identified in FY 1999. Funding level is appropriate considering the work scope involved.	0	100	200
■ **Mechanization Research** - Mechanization systems for energy crops, to lower harvesting/handling costs, will address a major obstacle to the widespread use of energy crops. Cost-shared opportunities for switchgrass handling and storage, specifically as a means of improving the ethanol production costs, will be explored. Handling and storage systems for the use of agricultural residues to produce ethanol will be evaluated to improve costs and process efficiencies. Funding level was determined by work scope and requires cost sharing.	50	150	350
Total, Feedstock Production	2,500	2,800	5,500
Regional Biomass Energy Program			
■ **Regional Biomass Resource Activities** - Regionally-focused activities with State and local governments, together with industry will further develop the capability to produce and use biomass resources for multiple products. Funding level is determined based on extensive prior experience with this activity and cost share requirements.	1,650	1,650	2,000
■ **Biofuels Production Resource Activities** - Using the regional program infrastructure, support will be provided for cost-shared site studies for biofuels production facilities, including resource assessments and analyses of local, State, and regional nontechnical issues.			
■ The potential of biodiesel will be improved by testing new biodiesel fuel formulations to enhance fuel performance of high			

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
efficiency engines, in collaboration with the Office of Heavy Vehicle Technologies in the Office of Transportation Technologies, USDA, and the National Biodiesel Board. Funding level is considered appropriate based on work scope and prior experience in this activity plus cost share.	350	600	1,500
Total, Regional Biomass Energy Program.	2,000	2,250	3,500

Integrated Bioenergy Technology Research and Development

- Coordination and integration of biomass related activities are critical to the future economic viability of biomass based products such as fuels, chemicals, and electricity. Increased collaboration among industry partners, stakeholders, DOE programs, and DOE laboratories is resulting in converging opinions on an industry R&D agenda and will lay the foundation for accelerating the development and use of diverse bioenergy feedstocks and enhance their capabilities to produce a variety of products responsive to market demands, thereby increasing the prospects for a broad-based bioenergy industry in the U.S. A total systems analysis will be initiated, with industry participation, to support the goal of optimizing the integration of bioenergy feedstocks, equipment, and end products for biomass energy systems. High priority technologies and processes will be identified, based on this and previous analyses, and provide a road map of future bioenergy system R&D needs. Common linkages and synergies will be identified and applied between fermentation, gasification, and other biomass-related activities currently funded by the Department. Existing and planned technology development projects supported by the Department's Biofuels, Biopower, and Industrial Programs will be re-evaluated and enhanced to allow for integrated processing of diverse feedstocks and options for a variety of products. The funding level is based on previous experience with similar projects, anticipated laboratory in-house costs, data gathered from stakeholders and the level of effort required to accomplish program goals. 0 0 6,000

Total, Biofuels Energy Systems.	12,391	19,453	27,933

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Ethanol Production	
■ Conduct advanced fermentation organism R&D at the pilot and small commercial scale in partnership with industry.	+800
■ Increase support for advanced cellulase research, including collaboration with enzyme and ethanol producers to accelerate the use of commercially-available cellulase systems.	+953
■ Increase support for shakedown, testing, and commercial demonstration of the countercurrent pretreatment reactor that will substantially lower biomass conversion costs for ethanol and other products.	+2,708
■ Discontinue support for The Consortium for Plant Biotechnology Research activities, which are geared to basic research and no longer meet program goals.	-1,250
■ Decrease support for industrial partnerships in order to focus on the development of the countercurrent pretreatment reactor.	-1,720
Total, Ethanol Production	+1,491
Biodiesel Production	
■ Conduct research and development to improve biodiesel technology and lower costs of production.	+250
Feedstock Production	
■ Increase is to fully support feedstock development centers, scale-up research, and mechanization research for the production of fuels and coproducts, in collaboration with Biopower Energy Systems.	+2,700
Regional Biomass Energy Program	
■ Increase to support the conduct cost shared site studies for biofuels production facilities and regionally focused activities that will include fuel formulation testing to improve biodiesel performance.	+1,250
Integrated Bioenergy Technology Research and Development	
■ Facilitate development of the bioenergy industry vision and roadmap and fund highly leveraged R&D for highest priority technologies.	+6,000
Total Funding Change, Biofuels Energy Systems	+11,691

Wind Energy Systems

Mission Supporting Goals and Objectives

Program Mission

The mission of the Wind Energy Systems Program is to enable U.S. industry to complete the research, testing, and field verification needed to fully develop advanced wind energy technologies that lead the world in cost-effectiveness and reliability. This mission is an investment in assuring that the United States will fully capitalize on an industrial development opportunity that can create thousands of jobs for the Nation, while increasing domestic and worldwide use of a technology that provides substantial environmental and energy security benefits.

Program Goals and Objectives

The Wind Program has established the following goals as measures of success in accomplishing its mission:

- Enable U.S. industry to capture 25% of worldwide markets for wind energy by 2005 (sales of over 1,000 MW worth over $1 billion each year), and
- Achieve 10,000 MW of wind generating capacity in the United States by 2010 (approximately 1,850 MW on-line in 1998).

The following objectives support achievement of the Program's goals:

- By 1999, U.S.- based wind turbine certification agent established.
- By 2002, wind turbines capable of 2 ½ cents/kWh at 15 mph wind sites available from U.S. companies.
- By 2004, three U.S. companies competing in utility-scale wind turbine markets.

These goals are directly supportive of broader Departmental strategic plans and objectives. The year 2010 capacity goal is a key contribution to realizing the Department's Comprehensive National Energy Strategy goal to achieve 25,000 MW of non-hydroelectric renewable generating capacity by 2010. Without the wind energy contribution of 10,000 MW by 2010 supported by the Wind Program's proposed strategy, this objective is not likely to be achieved. Wind capacity additions provide an energy security benefit since the resource is indigenous and renewable. Wind energy capacity additions make significant contributions responding to environmental objectives such as global warming mitigation and clean air by displacing emissions from fossil-fueled electric generation sources. National economic development objectives are supported by increasing the United States' share of the rapidly growing global market for wind energy systems.

Strategic Approach

During the 1990s, wind energy has been the fastest growing source of energy in the world, increasing at a rate of over 25% per year. Capacity additions in 1998 of over 2,000 MW brought total worldwide installed wind generating capacity to 9,600 MW, with industry sales over $2 billion. Improvements in wind energy technology have substantially reduced costs and increased reliability over the last decade. As a result, numerous organizations including the Royal Dutch Shell Group, the World Energy Council, and the European Commission have issued statements affirming a strong future for wind energy. The growth in wind energy use will displace airborne emissions, increase energy security, and provide economic growth opportunities throughout the world.

Installation of wind power stations in Europe and developing countries has accounted for most of the recent worldwide capacity increase, with wind turbines supplied primarily by European companies. Wind power development in the United States is beginning to recover from several years of stagnation, with approximately 200 MW added in 1998 and several hundred more forecast for 1999. However, the future of wind energy in the United States is still highly uncertain as electric power markets deregulate and increase emphasis on low cost of energy production. Continued wind energy technology development is needed to close the cost gap between wind and fossil power generation to assure the viability of wind energy in new competitive power markets, and to allow U.S. technology to compete overseas.

Wind Energy: A New Cash Crop for the Midwest

This 107 MW wind power plant, located in farmland near Lake Benton, Minnesota, was the world's largest wind generation facility at the time of its completion in 1998 by Enron Wind Corporation. Enron has publicly credited their research partnerships with the Department as essential to the development of the technology making this wind plant possible. Enron's turbine manufacturing subsidiary, Zond Energy Systems Inc. of Tehachapi, California, partnered with the Department under its wind turbine research and field verification programs for the development of the Z-550, Zond's first commercial wind turbine. The technical assistance, testing capabilities, and utility operating experience made possible by the Department's Wind Program were critical to the successful development of Zond's Z-750 turbine used in the Minnesota project. Enron Wind Corp. has several hundred additional megawatts of wind power now under development.

Action must be taken now to help strengthen and expand the U.S. industry, or foreign wind turbine manufacturers are likely to continue capturing a vast majority of the domestic and worldwide wind energy business. The Wind Program's proposed plan is a recovery strategy for the U.S. wind industry that has resulted from numerous meetings with wind industry leaders, electric utility representatives, and the wind energy research community. The strategy, which includes several elements that are already underway in the Wind Program, will bolster the U.S. wind industry through an aggressive program of:

- Continued applied research to develop cutting edge tools and concepts for wind energy system design efforts, technologies to expand wind energy applications, and strategies to assure cost-effective wind plant operation.

This activity provides the fundamental technological underpinnings needed to support the Program's partnerships with industry for advanced technology R&D.

Outcome from core research activities will be carried further through R&D partnerships between government and industry to develop and test innovative components and subsystems for use in new turbine designs, and to attract new participants to the U.S. wind industry. The WindPACT (Wind Partnerships for Advanced Component Technologies) project will continue U.S. technological improvement beyond the next-generation turbines to pave the way for further U.S. technology cost reductions. These reductions, as well as the emergence of new companies in support of the year 2004 objective, will contribute to increasing U.S. market share by 2005, as well as lead to increased domestic deployment of wind energy in support of the 2010 capacity goal. Wind energy expertise and innovative concepts available only from the Wind Energy Systems Program are the key to WindPACT for developing advanced technologies and rapidly cultivating wind energy technology capabilities in companies new to the wind industry.

- Continued turbine research and field verification. The role of the Turbine Research activity is to provide an opportunity for U.S. industry to apply the technology breakthroughs and design tools from Applied Research in developing advanced technology wind turbines. This role is implemented through close partnerships between the Wind Program's National Laboratories and U.S. companies via competitively awarded, cost-shared subcontracts, typically with 20% to 30% industry share. U.S. wind turbine manufacturers are thinly capitalized and for the most part incapable of financing a major turbine R&D project without government support at the front end. As the project develops, the industry partner assumes more of the cost-sharing. Wind turbines that result from the Next Generation, Near Term, and Small Wind Turbine projects under Turbine Research are critical to fulfilling the Program's cost of energy, market share, and domestic capacity goals.

  Field verification is an essential component of the technology development cycle, and also assures performance is proven to investors and financiers. New technologies enabling use of wind energy in hybrid power systems will also benefit from field verification in prototypic remote applications. The financial resources required to complete research and development leading to advanced technology, fully proven wind turbine and hybrid systems have been well beyond what the U.S. wind industry could afford during times of stagnant and uncertain domestic markets. Federal support of such efforts allows U.S. industry to begin positioning for technological leadership now, rather than waiting to establish enough financial capability to independently undertake the R&D needed to, as a minimum, simply maintain competitiveness.

- Continued priority focus on enhancing U.S. wind turbine certification capabilities and providing U.S. participation in the development of international consensus standards for wind turbine design, testing, and operation. These efforts will ensure that U.S. industry can meet certification requirements of many worldwide market opportunities for wind energy on a level playing field with foreign competition, in support of achieving the year 2005 market share goal.

- Facilitated transition to restructured electric power markets in the United States through Federally supported analysis activities and partnerships with wind farm operators to characterize power systems integration considerations of wind project performance, and to explore strategies to improve wind energy acceptance by system operators, power marketers and aggregators, and customers. U.S. manufacturers and developers are just beginning to recognize and adjust to the requirements of the

restructured marketplace and have not yet operated projects in which factors such as ancillary services have come in to play. The Wind Program's planned efforts in this area will lead to expanded opportunities for wind energy in the United States needed to meet the goal of 10,000 MW installed wind capacity by 2010.

Program Benefits

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.02	0.21	0.61
Energy Savings ($ Billions)	0.04	0.52	1.76
Carbon Displaced (MMTCE)	0.39	3.52	10.05

By 2000, the annual amount of energy generated from wind in the United States will be equivalent to the annual electricity needs of over 800,000 average households.

Performance Measures

FY 2000 Performance Measures

- Three prototypes will be installed for field testing under the Small Wind Turbine project.
- A prototype cold weather wind turbine will be installed at the National Wind Technology Center for certification and long-term reliability testing.
- 2,300 MW of domestic wind generating capacity achieved.

FY 2001 - 2006 Performance Measures

- Three new small wind turbines and one cold weather turbine will be commercially available to compete in international markets.
- Next generation turbines will be in operation, capable of producing electricity at $0.025/kWh at sites with 15 mph annual average windspeeds.
- Two additional U.S. companies will provide utility-scale wind turbines, compared with one in 1999.
- U.S. industry will capture 25% of the world market for wind energy.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- Advanced airfoils developed by the Wind Program have been adopted in three commercially available U.S. wind turbines, resulting in an increase in efficiency of up to 30% compared with

previously available blade designs. Several computational codes that are key to wind turbine design are now available or improved as a result of the Program's core R&D efforts.

- Zond Energy Systems' emergence as the leading wind turbine manufacturer in the United States followed successful collaborative efforts with Wind Program through a Turbine Research partnership formed in 1993, and a continuing partnership under the Turbine Verification Program. Zond, now the turbine manufacturing subsidiary of Enron Wind Corporation, publicly recognizes the critical technical contributions made by the Wind Program to the success of their technology.

FY 1998 Accomplishments

- Completed field experiment at the National Wind Technology Center (NWTC) to obtain detailed aerodynamic and structural measurements on an operating wind turbine rotor.
- Initiated two new cost-shared projects with host utilities for field verification of advanced wind turbine technologies.
- Obtained National Wind Technology Center accreditation for performing testing in compliance with International Standards Organization (ISO) requirements.

FY 1999 Planned Accomplishments

- Complete validation of advanced wind turbine design codes for application to extremely lightweight, flexible designs.
- Complete installation of prototype wind turbine under Near Term Research and Testing project, and begin field testing.
- Establish a U.S.-based wind turbine certification agent.
- Competitively select at least five distributed power field verification projects using smaller (≤ 100kW) wind turbines.

FY 2000 Planned Accomplishments

- Complete testing of the highly instrumented aerodynamics research turbine, previously tested at the NWTC, in the NASA Ames Research Center's 80 by 120 foot wind tunnel to establish steady inflow baseline performance data.
- Complete Near Term Research and Testing project.
- Complete first year of operation of five distributed power field verification projects using smaller (≤ 100KW) wind turbines.
- Operate utility-scale wind farms in eight additional U.S. states, compared to five at the beginning of 1998.

FY 2001 - 2004 Planned Accomplishments

- In 2001, the Small Wind Turbine and Cold Weather Turbine projects will be complete. In 2003, the Next Generation Turbine project will be complete.
- Cooperative Research and Testing - In 2002, at least one regional wind monitoring network will be in operation.

Program Completion

Success of the Wind Program will be gauged by completion of year 2005 and 2010 goals. In 2005, if the United States has achieved a 25% share of the world wind energy market, the program will transition away from aggressive technology development activities, and into a reduced maintenance level, providing industry unique services such as certification testing, support for resolving crosscutting issues in the industry (such as power systems integration studies), and research to improve and maintain the analytical tools needed by industry for their own technology development activities. If the capacity goals of 2010 are achieved, then an evaluation will be conducted to determine the appropriate level, if any, for continued Federal support for the U.S. wind industry.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Applied Research	11,101	10,700	13,500	+2,800	+26.2%
Turbine Research	13,000	16,400	20,200	+3,800	+23.2%
Cooperative Research and Testing	8,027	7,671	11,900	+4,229	+55.1%
Total, Wind Energy Systems	32,128	34,771	45,600	+10,829	+31.1%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Applied Research

- The core research element of Applied Research focuses on advancing the U.S. wind energy technology base through research, testing, and analysis on the complexities of wind and how it interacts with wind turbine rotors, how wind turbine structures and materials react and withstand the forces of wind over time, and how all parts of wind energy systems - blades, drivetrains, generators, power convertors, control systems, and towers - can be optimized for cost effectiveness and reliability. These efforts culminate in improved computational codes for wind turbine design, and identification and verification of improved wind turbine design features. Industry has relied on the Department and its laboratories for this type of research because individual

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
industry members are under-capitalized, have had little research capability, and are focused primarily on developing products. The funding level requested is based on historical experience in planning and managing numerous core research projects, and will support core research in aerodynamics, wind characteristics and forecasting, structural dynamics, and advanced components, such as adaptive blades and direct drive variable speed generators, to provide breakthrough technologies to improve cost/performance of wind technology. Field testing will be conducted at the National Wind Technology Center to further understandings of ambient inflow, turbulence, complex terrain, and rotor dynamics, leading to improved wind turbine design tools. Activities under the core research component of Applied Research are consistent with the recommendations of the President's Committee of Advisors on Science and Technology (PCAST) report on energy research and development to support research on computational fluid dynamics, light weight adaptive structures, advanced control systems, variable speed and direct drive generators.	8,801	8,600	8,000
■ Promising research ideas and concepts generated in Applied research activites will be further developed and tested by a joint team of industry and laboratory researchers under a new activity, Wind Partnerships for Advanced Component Technologies (WindPACT). Two to three R&D subcontracts will be competitively selected to explore potential concepts such as light-weight and direct-drive generators, flexible and articulated rotors, feedback controls for load alleviation, and high efficiency power converters. WindPACT will provide the avenue needed to continue transfer of technology from the Program's core research activities to industry, beyond what will occur in the next-generation turbine efforts. The added technology advancement will contribute to entry of additional U.S. wind companies with leading-edge, highly cost-effective			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
products making a contribution to meeting the program's 2005 25% world market share goal, as well as the 2010 domestic capacity goal. The funding requested will support an appropriate level of laboratory effort to bring two to three candidate technology concepts to the stage of development needed to then initiate competitively selected multi-year industry partnerships.	0	0	3,000
■ The Wind Program relies on universities (including Historically Black Colleges and Universities (HBCUs) and Hispanic Educational Industries) to provide new theories and concepts for improved wind technologies. Funding requested is required to support a new competitive solicitation for advanced aerodynamic modeling codes, wind turbine controls research, and to continue materials research with Montana State University in coordination with the Office of Science (formerly the Office of Energy Research).	1,000	1,100	1,000
■ Applied Research also includes R&D for technologies that enable wind to be used in stand-alone, hybrid power systems. The combined use of wind turbines with diesel generators and other renewables and storage systems is a potentially major market for U.S. technology. The major research issue is design of a control system to allow the diesels to be turned off when possible to reduce overall consumption of diesel fuel. In addition to control systems R&D, the Program is supporting a control system field verification project in Alaska, with approximately 60% of project funding provided by sources other than the Department. The requested funding level is based on the anticipated laboratory in-house, consultant, and hardware costs for completing testing of a new wind hybrid power system, with an industrial partner, using the NWTC wind/hybrid test facility. The funding will also continue support of hybrid wind projects in Alaska, and evaluation of commercial control systems at the NWTC hybrid power test bed and at the USDA research facility in Bushland, Texas.	1,000	700	1,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Avian concerns can pose a significant challenge to siting and operation of wind turbines. For this reason, continued research is needed to identify mitigation measures that would reduce adverse impacts that might otherwise occur, and to provide guidance for appropriate siting of wind facilities. The requested funding level is based on requirements for supporting laboratory in-house costs, and initiation of a subcontracted control study of avian impacts at an operating wind facility.	300	300	500
Total, Applied Research.	11,101	10,700	13,500

Turbine Research

■ The Next Generation Turbine project is the Wind Program's primary investment in achieving a cost of energy from wind of $0.025/kWh by 2002. This project is focused on completing research and development with two industry partners leading to state-of-the-art utility scale (500kW - 2MW) wind turbines. Requested funding is based on projected spending for the two cost-shared industry subcontracts (30% industry share), and will support component qualification testing and final design of engineering and manufacturing development turbines.	5,000	3,100	8,000
■ Conduct Near Term Research and Testing project to support U.S. industry in reducing costs, enhancing reliability, and obtaining certification for wind turbines targeted for near-term markets. The funding level requested is based on projected spending requirements for one subcontract and will support final design and field testing of a 750 kW prototype turbine, and completion of the project.	2,000	3,600	400
■ Conduct Small Wind Turbine projects to assist U.S. industry in research and development of wind turbines in the 8-40 kW range for stand-alone, remote, hybrid, and home/farm power applications. The requested funding level is based on spending projections for three subcontracts, and will support completing installation and beginning field testing of three small wind turbine prototypes.	500	700	1,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The Wind Program will take the lead in completing prototype development, testing, and field verification for the Cold Weather Turbine project, targeted for locations such as Alaska and the South Pole, as the third phase of a Small Business Innovation Research effort begun by the National Science Foundation and the National Aeronautics and Space Administration. The project will employ direct-drive generator technology developed under the Wind Program's Next Generation Innovative Subsystems project to be completed in FY 1999. The requested funding level is based on projected spending for one industry subcontract, and will support completing research and development for the cold weather turbine prototype, and initial testing at the National Wind Technology Center and a location in Alaska.	0	300	800
■ The supporting research and testing element of Turbine Research assures that industry's wind turbine R&D efforts take full advantage of the Wind Program's technology developments, and provides resources to conduct testing and analysis otherwise unavailable to industry. Field verification of new wind turbine technologies serves a vital function in Turbine Research by continuing close technical support through industry's initial installation of turbines in actual utility operating environments. Further, field verification projects provide an avenue for accelerating the regional diversification of wind energy by supporting installation of advanced wind technologies in several new areas across the Nation. Funding requested for supporting research and testing is based on previous experience with the level of support needed for Turbine Research and Turbine Verification Program activities, and the industry and utility cost-sharing level of 20% to 75%. The funding will support design review, analysis and testing services needed for several new on-going Turbine Research subcontracts with industry. In addition, field verification projects will be initiated that will be tailored to satisfy specific regional needs. Technical and data analyses support will be continued for ongoing Turbine Verification Program projects as well as for smaller wind turbine field verification projects initiated in FY 1999. ...	5,500	8,700	10,000
Total, Turbine Research.	13,000	16,400	20,200

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Cooperative Research and Testing			
■ Cooperative Research and Testing will provide support to the U.S. wind industry, focused through the National Wind Technology Center, in resolving near-term technical problems and providing technical support for competing in world markets. The requested funding level is based on past experience in the level of support needed to complete activities that assist the U.S. wind industry in resolving near-term technical problems and enhancing technology transfer, providing technical support for the U.S. manufacturers competing in world markets, and supporting domestic field verification projects such as the Navy wind project on San Clemente Island, and estimated cost-sharing of 50%.	3,600	1,500	3,000
■ Initiate a new cooperative effort with industry, Hybrid Systems for Village Power, that will follow from the ongoing hybrid field verification projects in Alaska and provide additional opportunities for field verification of new wind hybrid power systems technologies developed under Applied Research. This project will verify and improve technologies that enable reducing fuel use and emissions at existing stand-alone diesel power systems in Alaska and other States, U.S. trust territories, Native American communities, and in many overseas remote applications. The requested funding level is based on the Wind Program's previous experience with the cost of similar field verification and hybrid systems projects. Two to three projects will be competitively selected and cost-shared by the local utility and/or village.	0	0	2,500
■ Continue support for developing international consensus standards for wind turbine design, and the establishment of wind turbine certification capability in the United States. Both of these activities are essential to maximizing U.S. industry's prospects for international sales, and thus increased market share. The requested funding is based on anticipated laboratory in-house costs, consulting and equipment costs for internationally-accepted standards			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
activities and continued certification program development and testing for the newly established U.S. based wind turbine certification agent.	2,000	3,371	2,500
■ The Wind Energy Systems Program seeks to competitively fund the startup and infrastructure costs of a voluntary Wind Performance Monitoring Network in the Midwest in which the operator would become self-supporting after the initial startup. The result of this effort will be verifiable data on long term performance of these new wind projects, especially concerning ancillary service requirements, and strategies to accelerate the use of wind energy by wind developers, power marketers, renewable and other power aggregators and power system operators. The Wind Performance Monitoring Network is vital to the overall Wind Program effort to study and understand the integration of wind energy into the electric power systems to facilitate utility sector acceptance. As a high capital cost, low fuel cost option, wind energy is currently at a disadvantage in the restructured marketplace that favors low capital, low fuel cost options such as natural gas. In addition, the rules of the emerging marketplace require that each generating project pay for its share of costs related to transferring power to point of use and providing a secure system. FERC calls these costs 'ancillary services' and requires a generator to provide or acquire them. Also, the variation of the wind resource across a region is critical to determining the value of wind energy in the new competitive marketplace. The requested funding level is based on laboratory in-house costs for on-going studies and to initiate the wind monitoring network.	1,127	1,500	2,600
■ Continue operation of the National Wind Technology Center operations to maintain world class research and testing capabilities and facilities for the U.S. wind industry. The requested funding level is based on requirements for laboratory site support staff, contractors and equipment.	1,300	1,300	1,300
Total, Cooperative Research and Testing	8,027	7,671	11,900
Total, Wind Energy Systems	32,128	34,771	45,600

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Applied Research	
■ The increase supports the Wind Partnerships for Advanced Component Technologies project which will develop 2-3 innovative concepts in the laboratory, and competitively select industry partners for further development. . .	+2,800
Turbine Research	
■ The increase supports planned higher spending on next generation turbine subcontracts in FY 2000 as these efforts enter a peak period of engineering development and hardware procurement.	+3,800
Cooperative Research and Testing	
■ The increase supports Hybrid Systems for Village Power project and a Wind Monitoring Network in which several new partners will be competitively selected to carry out field activities for these projects.	+4,229
Total Funding Change, Wind Energy Systems	+10,829

Renewable Energy Production Incentive

Mission Supporting Goals and Objectives

Program Mission

The mission of the Renewable Energy Production Incentive (REPI) is to encourage the acquisition of renewable energy generation systems by state and local governmental entities and non-profit electric cooperatives. For these tax-exempt owners of new renewable energy generation systems, REPI provides financial incentives that are comparable to the value of either production tax incentives or investment tax credits that are available to the private-sector owners of certain types of new renewable energy generation systems. For comparability, new renewable energy generation systems that use solar, wind, geothermal, or closed-loop biomass technologies receive priority for REPI payments over systems that use allowable open-loop biomass technologies. Each qualified facility, first operated in the fiscal year 1994-2003 time frame, is eligible for incentive payments for the net electricity produced during the first 10 fiscal years of its operation, subject to the availability of annual appropriations.

Program Goals and Objectives

A major goal in the annual budget request for REPI is to provide financial incentives for public entities that acquire new renewable energy generation facilities that are comparable to the tax incentives that are available to the private sector. In order to accomplish this goal and to maintain a balanced portfolio for the Solar and Renewable Energy account, full incentive payment funding is planned for all new qualified facilities that use solar, wind, geothermal, and closed-loop biomass technologies. A lesser level of payments is planned for new qualified facilities that use open-loop biomass technologies.

Strategic Approach

Both the Department's Strategic Plan and the Comprehensive National Energy Strategy have a goal of doubling the non-hydroelectric renewable energy generating capacity by 2010. The portfolio of renewable energy research and development programs is improving the performance and reducing the cost of these technologies. However, temporary government support, as envisioned in the report of the President's Council of Advisors on Science and Technology, is needed to facilitate the demonstration and use of these technologies. REPI provides this temporary financial support to the non-Federal public sector. This financial support is comparable to the value of tax incentives that are being provided to the private sector for the near-term acquisition and operation of solar, wind, geothermal, and closed-loop biomass generation systems.

Program Benefits

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.02	0.10
Energy Savings ($ Billions)	0.00	0.05	0.25
Carbon Displaced (MMTCE)	0.09	0.33	1.43

Performance Measures

- FY 1998 appropriations provided incentive payments for qualified facilities that generated approximately 460[a] million kilowatt-hours in fiscal year 1997.
- It is anticipated that REPI will annually facilitate the addition of new qualified facilities to the program through fiscal year 2003 with these facilities producing approximately one billion kilowatt-hours of electricity in fiscal year 2003.

Significant Accomplishments and Program Shifts

FY 1998, FY 1999, and FY 2000 appropriations will be sufficient to make production incentive payments for all of the electricity generated by qualified facilities which use solar, wind, geothermal, or closed-loop biomass technologies. Only a portion of the electricity produced by qualified facilities which used open-loop biomass technologies will receive incentive payments, determined by the availability of remaining appropriated funds.

Program Completion

The last fiscal year of electric production that is eligible for payments under this program is FY 2012. Therefore, production incentive payments using FY 2013 appropriations, if provided, will be the final planned activity for this program.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Renewable Energy Production Incentive	2,954	4,000	1,500	-2,500	-62.5%
Total, Renewable Energy Production Incentive	2,954	4,000	1,500	-2,500	-62.5%

[a]The change from 570 to 460 is due to a recent discovery by the Golden Field Office of an error in computations by the applicant of the program's largest qualified facility.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Annual Production Incentive Payments			
■ Payments will be provided to the owners of approximately 25 qualified facilities at the rate of about $0.017/kWh. Make full production incentive payments for all the electricity produced by qualified facilities that use solar, wind, geothermal, or closed-loop biomass technologies. This provides comparability to tax incentives provided to private sector owners of similar systems. Payments for only a small portion of the electricity, on a pro rata basis, will be made to owners of facilities that use open-loop biomass technologies.	2,954	4,000	1,500
Total, Renewable Energy Production Incentive	2,954	4,000	1,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Renewable Energy Production Incentive	
■ The decrease is due to shift of funds to higher priority R&D activities. Since comparable incentives are not provided to private sector owners of these systems, provide a lesser level of incentive payments to qualified facilities that use open-loop biomass technologies.	-2,500
Total Funding Change, Renewable Energy Production Incentive.	-2,500

Solar Program Support

Mission Supporting Goals and Objectives

This budget category consists of two components: Electricity Restructuring and Competitive Solicitation. Each is discussed individually below.

Program Mission

Electricity Restructuring - The mission of the Electricity Restructuring program is to provide unbiased technical assessments to Federal and State officials of utility restructuring issues relating to renewable energy and energy efficiency. The assessments will help decision makers at the Federal and State levels both develop and coordinate utility restructuring regulations and legislation to ensure suitable policy and market mechanisms for renewable energy and energy efficiency.

Competitive Solicitation - The mission of this program is to obtain, analyze, and disseminate essential cost and operational information necessary to overcome the perceptions of risk in selecting renewable energy and hybrid renewable energy generation/cogeneration systems for use in the competitive electric market.

Program Goals and Objectives

Electricity Restructuring - The goal of Solar Program Support is to assist State, regional, and Federal agencies in developing utility restructuring concepts for energy efficiency and renewable energy technologies and programs. A key objective is to assess the costs and benefits of renewable portfolio standards, public benefits funds, consumer information and disclosure provisions, green marketing programs, distributed generation concepts, and other policy and market mechanisms for energy efficiency and renewable energy technologies in restructured utility markets. Another objective is to provide unbiased information and materials to State, regional, and Federal decision makers on the costs and benefits on utility restructuring concepts for energy efficiency and renewable energy technologies and programs. Also, to assist in the coordination of Federal, regional, and State agencies in the implementation of utility restructuring legislation and regulation for energy efficiency and renewable energy technologies and programs following enactment of Federal legislation.

Competitive Solicitation - Through a technology-focused and competitive process, carry out targeted field validation efforts that simultaneously: 1) prove the availability of clean, affordable, and reliable electric power supply options for many remote and/or economically challenged regions of the Nation; and 2) obtain essential data on operational performance, reliability, and benefits of renewable energy and hybrid renewable energy generation/cogeneration systems in various geographic locations and climatic conditions.

The objectives from this effort will be to make information resulting from these validation efforts available, in easy-to-understand format, to decision makers considering additional or replacement power generation systems; and substantially contribute to the achievement of tripling renewable energy

generation capacity (non-hydroelectric) in the U.S. by 2010, consistent with both the Department's Strategic Plan and the Comprehensive National Energy Strategy.

Strategic Approach

Electricity Restructuring - The Electricity Restructuring Program seeks to inform state energy and environmental policy officials about the potential effects of utility restructuring policies and regulations on the development and deployment of renewable and energy efficiency technologies and programs. This is accomplished through technical analysis and assistance to key state officials on policy and market based mechanisms for supporting renewable and energy efficiency technologies in competitive utility markets.

The program accomplishes this mission by sponsoring technical analysis and outreach to disseminate findings quickly and cost effectively. The program establishes partnerships with State, regional, and national organizations that have roles in utility restructuring legislation and regulation.

The program is critical to the future of energy efficiency and renewable energy technologies in restructured electricity markets. Federal electricity restructuring legislation is pending. Some States have implemented electricity restructuring legislation and/or regulations, others have not. There is no national effort, other than this program, aimed at achieving better Federal-State coordination on electricity restructuring and energy efficiency and renewable energy technologies and programs.

Competitive Solicitation - Competition resulting from the restructuring of the electric utility industry will favor the selection of systems with low first costs over systems with higher first costs, but comparable or lower life-cycle costs. From a risk perspective, energy providers will also select advanced generation technologies that have evolved from familiar fossil-fuel technologies, which have had long service lives and high levels of reliability and scheduled availability. Emerging generation technologies, such as renewable energy, are at a market selection disadvantage due to the lack of comparable cost and operational information. This multi-year program is directed at obtaining vital cost and operational information for a wide variety of systems in various sectors (including Federal facilities and Native American localities) and various geographic regions. By 2004, the program will have completed planned funding of cost-shared field verification projects for renewable energy and hybrid renewable energy generation/cogeneration systems.[a]

The portfolio of renewable energy research and development programs is improving the performance and reducing the cost of these technologies. However, reports such as that by the President's Council of Advisors on Science and Technology indicate that R&D alone is not sufficient to launch new technologies in the market. Among the substantial market barriers discussed in this report are the perceptions of risk with new emerging technologies, such as renewable energy generation. To address these perceptions of risk, this program funds a spectrum of cost-shared field verification projects in various geographic regions to obtain the needed cost and operational information for these renewable energy systems.

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[a]Hybrid systems could include combinations of renewable energy generation technologies, integrated renewable energy/energy storage systems, and integrated systems utilizing renewable energy and fossil fuels (such as natural gas or coal).

The Competitive Solicitation program is designed to combine the various activities previously conducted under two separate line items (the Renewable Indian Energy Resources and Federal Buildings/Remote Power programs) into a single, integrated effort that provides highly cost-shared competitive awards to projects selected across a diverse range of geographic locations. A deliverable requirement is 3 years of operational information on field verification projects, including the amount of electric generation and system outage information, if any.

The program is composed of three competitive components: systems benefitting Native Americans, systems benefitting Federal facilities, and systems that would be selected in an open portion of the solicitation. Cost-sharing requirements for all work would be in the ratio of 3 non-DOE dollars to each DOE dollar of funding for systems benefitting Federal facilities and systems selected under the open portion.

For systems benefitting Native Americans, the cost-sharing of 25 percent or greater per DOE dollar of funding would be encouraged. Where feasibility studies are funded, the same cost-sharing goals apply. For systems benefitting Federal facilities, the provisions of Executive Order 12902, "Energy Efficiency and Water Conservation at Federal Facilities" will be applied. Since this Executive Order requires comprehensive facility audits, the funding of feasibility studies will not be required to ensure a viable pool of field verification projects. These projects will be competitively selected under a process managed by the Department's Federal Energy Management Program. The other two categories (systems benefitting Native Americans and systems selected under the open portion) will be administered through a competitive financial assistance process. In order to ensure a viable pool of field verification projects over the time frame of this program, a portion of the funding for these categories in FY 2000 will be used for cost-shared feasibility studies. These studies will address the economics, needed licenses and permits, and potential environmental issues for the proposed field verification project.

Assuming level funding over the six-year life of the Competitive Solicitation program, up to 200 field verification projects utilizing renewable energy will be installed in various locations across the Nation (the actual number of projects depends upon the size and cost of projects selected from the annual competitions).

Program Benefits

Metrics	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.00	0.00
Energy Savings ($ Billions)	0.00	0.00	0.00
Carbon Displaced (MMTCE)	0.01	0.06	0.06

Although the primary purpose of this program is field verification of various power generation systems that utilize renewable energy technologies, the impact upon the lives of those receiving the electricity from these systems is not insignificant. In fact, once all the projects are completed these systems will produce the amount of electricity needed to power more than 22,500 homes across the Nation.

Performance Measures

FY 2000 Performance Measures

Electricity Restructuring

- Increased consistency between State and proposed Federal legislation in the key parameters for renewable portfolio standards, public benefits funds, net metering programs, and consumer information and disclosure provisions.
- Increased number of publications, technical analyses, and presentations for State officials on electricity restructuring issues.
- Increased level of understanding by State officials on electricity restructuring issues as demonstrated by State policy decisions to support public benefit mechanisms.
- Development of at least two regional market strategies, indexes, for energy efficiency technology deployment and effectiveness measurement techniques for use by States in their restructuring legislation and regulations.

Competitive Solicitation

- Not applicable - new program in FY 2000. See Planned Accomplishments for projected FY 2000 achievements for this program.

FY 2001 - 2006 Performance Measures

Electricity Restructuring

- Increased number of information publications, materials, industry web site access, conference presentation over FY 2000.
- Development of two additional regional market strategies for energy efficiency technology deployment.
- Legislation enacted by all States consistent with proposed Federal electricity restructuring legislation requirements for public benefits.

Competitive Solicitation

- The six year program will result in at least 100 cost-shared field verifications of renewable energy and renewable energy hybrid generation/cogeneration systems of various system configurations for various geographic regions.
- The direct savings of the systems should be approximately $4,500,000 annually in energy costs. Indirect savings will be substantially higher; the cost and operational information from these systems will address the market perceptions of risk in the selection of these systems and thereby facilitate the selection of similar systems.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

Electricity Restructuring

- No program funds available.

Competitive Solicitation

- No program.

FY 1998 Accomplishments

Electricity Restructuring

- No program funds available.

Competitive Solicitation

- No program.

FY 1999 Planned Accomplishments

Electricity Restructuring

- Funding for this program was appropriated through Solar Program Direction.
- Reports on the impacts and implementation policies of State restructuring legislation and regulations on renewable and energy efficiency technologies.
- Two regional workshops on electricity restructuring issues.
- Technical assistance on electricity restructuring issues provided to States, individually.
- Technical assistance to State organizations on electricity restructuring issues.

Competitive Solicitation

- No program.

FY 2000 Planned Accomplishments

Electricity Restructuring

- Reports on the impacts and implementation policies of State restructuring legislation and regulations on renewable and energy efficiency technologies.
- Two regional workshops on electricity restructuring issues.
- Technical assistance on electricity restructuring issues provided to Sates, individually.
- Technical assistance to State organizations on electricity restructuring issues.

Competitive Solicitation

- Competitively aware approximately 1-25 field validation projects and initiate development of same. Selected projects will reflect a range of technology applications and a diversity of geographic locations and climate conditions.

FY 2001 - 2004 Planned Accomplishments

Electricity Restructuring

- Reports on the impacts and implementation policies of State restructuring legislation and regulations on renewable and energy efficiency technologies.
- Two regional workshops on electricity restructuring issues.
- Technical assistance on electricity restructuring issues provided to States, individually.
- Technical assistance to State organizations on electricity restructuring issues.

Competitive Solicitation

- A sufficient range of 100-200 highly leverages (a minimum of 50% cost-share is required except in the Native American component which requires 25%), competitively-awarded projects would be funded under this program. Projects would be selected based upon criteria ensuring technology and configuration variety, high value of data to be received, and geographic/climate diversity. Such a diverse array of projects operating under a range of conditions is essential in order to reduce the perceptions of risk surrounding the development of power generation facilities that utilize renewable energy technologies, and to obtain the hard performance data required by potential decision makers, investors and financial institutions.

Program Completion

Electricity Restructuring

The Electricity Restructuring program will be completed by FY 2005, as all States implement their individual and Federal restructuring requirements.

Competitive Solicitation

Assuming level funding over the planned six-year lifetime of this program, final cost-shared field verification project awards will be made by FY 2005. Projects initiated in FY 2005 should be completed by the end of FY 2006. Data on operational performance, system reliability, and other essential project information is required from each project once its operation begins so that this information can be consolidated and shared with decision makers considering the use of renewable or hybrid renewable power when they are faced with adding new or replacing existing power supplies. The comparatively small, but vital, project information collection component of this effort is projected to continue until approximately FY 2009 - FY 2010, at which time the entire program will conclude.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Electricity Restructuring					
Technical Analysis & Technical Assistance	0	0	2,000	+2,000	>999.9%
Competitive Solicitation					
Feasibility Studies	0	0	1,000	+1,000	>999.9%
Field Verification Projects	0	0	7,000	+7,000	>999.9%
Subtotal, Competitive Solicitation	0	0	8,000	+8,000	>999.9%
Total, Solar Program Support	0	0	10,000	+10,000	>999.9%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Electricity Restructuring

- **Technical Analysis and Assistance** - Electricity restructuring information and analyses will be disseminated to State and regional electricity agencies, power supplies, energy service companies, and other market participants on energy efficiency and renewable energy technologies in competitive electric markets. The information will focus on what has worked in one region or state to assist other states in development of their policies or restructuring. Publications, presentations, web site development will be used to disseminated these "lessons learned." Substantive expertise in utility regulations, energy technologies, and power systems is required to provide accurate, unbiased analyses of the changing competitive marketplace.

  Specific analytic activities include analysis of policy mechanisms such as information disclosure provisions, renewable portfolio standards and public benefits funds. Analysis of future utility and regulatory systems such as distributed power, bid-based pools, and real-time pricing will be performed. Analysis of market mechanisms such as labeling of electricity products for consumers, "green" certification, and energy services strategies will also be completed. Technical assistance will be provided to support regional State, and Federal decision makers in the

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
electricity restructuring process. Funds will be provided if selected in a competitive solicitation process, to key electric utility governmental associations, such as the National Association of State Legislatures, National Association of State Energy Offices, and others. The funds will support regional networks, seminars, workshops, information dissemination mechanisms such as web sites, in order to inform decision makers on electric restructuring and the role of energy efficiency and renewable energy technologies. These activities will ensure that State have the most recent, accurate, and unbiased information available on electric restructuring and the impacts on renewable and energy efficiency technologies.			
The funding level for the technical analysis and assistance activities is appropriate given the expected number of States (30) that will be implementing electricity restructuring activities in FY 2000. The level of funds is also based on experience with competitive selection of State organizations for technical assistance as appropriate to meet the informational and technical analytic needs of State decision makers.	0	0	2,000
Competitive Solicitation			
■ Conduct cost-shared feasibility studies required to ensure a viable pool of field verification projects. These funds will enable the competitive selection of cost-shared feasibility studies which will provide a pool of viable field verification projects in the remaining years of the program. Any unnecessary amount of this requested portion of the Competitive Solicitation would be applied to field verification project completion.	0	0	1,000
■ Cost-shared field verification projects to obtain needed cost and operational information. A sufficient range of 100-200 highly leveraged (a minimum 50% cost-share is required except for the Native American component which is 25%), competitively-awarded projects would be funded over the lifetime of this program. Projects (approximately 15-25)			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
would be selected based upon criteria ensuring technology and configuration variety, high value of data to be derived, and geographic/climate diversity. Such a diverse array of projects operating under a range of conditions is essential in order to obtain the hard performance data required by potential decision makers, investors and financial institutions and to reduce the perceptions of risk surrounding the development of power generation facilities that utilize renewable energy technologies. The funding levels requested below were established through experience-based estimates of the range of possible projects and required cost-share levels, are consistent with program goals and objectives, are equivalent to the combined funding levels of the former Renewable Indian Energy Resources Program and the Federal Buildings/Remote Power Program from which this consolidated program is derived, and are sufficient to meet anticipated FY 2000 needs.	0	0	7,000
Total, Competitive Solicitation	0	0	8,000
Total, Solar Program Support	0	0	10,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Electricity Restructuring	
■ $1,900,000 for Electricity Restructuring, previously funded under Program Direction, is increased $100,000 under Solar Program Support. These funds will provide increased technical analysis on electric restructuring impacts on renewable and energy efficient technologies which will be disseminated to State decision makers.	+2,000
Competitive Solicitation	
■ The $8,000,000 will initiate this activity to include $1,000,000 for feasibility studies to support competitive selection of cost-shared feasibility studies to ensure a pool of viable field verification projects, and $7,000,000 for the initial round of projects.	+8,000
Total, Funding Change, Solar Program Support	+10,000

International Solar Energy Program

Mission Supporting Goals and Objectives

Program Mission

The Solar International Program's mission is to encourage the acceptance and use of U.S. renewable energy technologies by developed transition and developing countries in support of U.S. national interests and policies. The Solar International Program, achieves its mission by advancing technology development and deployment based on selection and implementation of priority activities, working cooperatively with the private sector, federal agencies, and others.

Program Goals and Objectives

EERE activities carried out jointly with other countries contribute directly to fulfilling critical Department of Energy missions — achieving efficiency in energy use, diversity of energy supply, a more productive and competitive economy, improved environmental quality, and enhanced energy security.

Widespread use of U.S. energy efficiency and renewable energy technologies can help meet the energy needs of developed, transition and developing countries; reduce the rate of consumption of finite global resources; and address local and transnational environmental issues. More efficient use of fossil fuels and increased use of renewable energy improves U.S. energy security. By shifting consumption away from traditional, but non-sustainable energy resources, the local environmental impacts of fossil fuel production and consumption can be mitigated, while concurrently reducing regional instability by reducing competition for scarce resources.

Expanding U.S. exports will help U.S. industries achieve manufacturing economies of scale. This will contribute to the cost competitiveness of U.S. energy efficiency and renewable energy technologies both domestically and internationally by lowering their unit costs. In addition, increased sales of U.S. energy efficiency and renewable energy technologies create jobs in the high-technology sector, where U.S. labor enjoys a comparative advantage and salaries are markedly higher than in other sectors. These efforts, and others, help U.S. industry gain a foothold in the fastest growing, and often most difficult-to-penetrate, international markets for energy products and services. Such sales by U.S. industry also generate the revenue needed to support continued domestic research and development toward improving technology and product performance. Without increasing research and development expenditures, other nations will continue to erode the U.S. technological advantage built during the 1980's.

Facilitating international technology cooperation advances U.S. interests in global energy and environmental objectives in bilateral and multilateral discussions, agreements and treaty negotiations. Developing and facilitating the deployment of appropriate technologies offers U.S. industries the opportunity to adapt existing or emerging technologies to meet unique needs and conditions of developing and transition countries. Technologies that may face significant commercial barriers domestically may be readily adaptable to large and growing markets in the developing world.

Given the large number of requests for international initiatives and activities, the Office of Energy Efficiency and Renewable Energy will use a set of evaluation criteria to assist with selection of priority

activities. These criteria will consider whether the proposed activity advances U.S. strategic interests and policies; the DOE mission; opportunities for leveraging U.S. funds; national, regional or global impacts; potential for replication; contribution to technology development; commitments by other partners; likely impact on U.S. market competitiveness; and other relevant factors. EERE international activities will be screened, ranked, and implemented appropriately.

Strategic Approach

The International Solar Energy Program and U.S. Initiative on Joint Implementation will be refocused in FY 2000 using the three specific elements of Emerging Global Environmental and Energy Issues, Market and Trade Development, and Energy and Environmental Security.

While the use of essentially all renewable energy and energy efficiency technologies can help mitigate global climate change and other associated environmental and health threats, the Emerging Global Environmental and Energy Issues element will be implemented specifically through and in conjunction with the U.S. Initiative on Joint Implementation (USIJI). USIJI is a DOE-lead interagency program that supports the development of flexibility mechanisms under the U.N. Framework Convention on Climate Change (FCCC) such as Joint Implementation (JI), Clean Development Mechanism (CDM), and Emissions Trading. Meaningful participation by developing countries in the proposed 1997 Kyoto Protocol to the U.N. FCCC will also be accelerated.

The Market and Trade Development element will accelerate reductions in technology production costs and advance deployment of technologies through overseas market expansion. It will stimulate global economic development and regional economic stability, and accelerate domestic economic growth and employment. This element will be implemented in key regions through bilateral (e.g, Gore-Mbeki) and multilateral (e.g., Asia Pacific Economic Cooperation, Hemispheric Initiatives and International Energy Agency) technology cooperation activities and information dissemination. The program will facilitate private sector technology development and deployment in strategic and emerging markets will be stimulated through project based activities.

The Energy and Environmental Security element is designed to advance U.S. strategic interests in bilateral and multilateral energy and environmental security activities and will provide specialized assistance in the utilization of appropriate technologies. This element will be implemented in support of existing and emerging bilateral and multilateral treaties and agreements (e.g., U.S.-China Energy Efficiency and Renewable Energy Protocol). In addition to these planned activities the program will help meet U.S. obligations and commitments to provide disaster relief and assistance by facilitating greater use of energy efficiency and renewable technologies that are appropriate for local conditions. These activities will be consistent with applicable legislative and budgetary authorities.

Program Benefits

Metrics

By FY 2005, the Solar International Program will stimulate $10.00-$20.00 in exports for every dollar spent.

The International Solar Energy Program will yield benefits in terms of the environmental and energy savings in the countries purchasing the technologies, while increasing U.S. exports, jobs, and Federal tax revenues.

Performance Measures

FY 2000 Performance Measures

- Provide technical assistance to U.S. companies and key developing and transition countries interested in participating in Joint Implementation, and the other flexible market based mechanisms under the U.N. Framework Convention on Climate Change. Co-sponsor two project development activities.
- Accept 5-10 projects that satisfy the interagency U. S. Initiative on Joint Implementation program's established criteria.
- Provide technical assistance support to the implementation and evaluation of five technology deployment projects initiated by the private sector or other parties in selected key countries.
- Educate other agencies involved in disaster relief in the opportunities for using energy efficiency and renewable energy technologies to meet humanitarian and economic redevelopment needs of disaster stricken communities.
- Provide technical assistance to one-to-two disaster relief efforts which demonstrate the benefits of energy efficiency and renewable energy technologies.

FY 2001 - 2006 Performance Measures

- Co-sponsor six project development activities in key regions and in key developing and transition countries to build greater capacity in other nations and their local organizations to facilitate meaningful participation in Joint Implementation, and the Clean Development Mechanism under the U.N. Framework Convention on Climate Change (FCCC). These activities would also include technology cooperation efforts that facilitate local acceptance and use of U.S. technologies, and meet U.S. commitments to promote clean energy technologies under the U.N. FCCC.
- Sponsor three project development events in the U.S. for developing private sector interest in Joint Implementation, Clean Development Mechanism and Technology Cooperation.
- Accept 5-10 projects that meet the criteria established by the interagency U.S. Initiative on Joint Implementation (USIJI). Build greater capacity for U.S. companies and other project developers to effectively prepare project proposals with sufficient information to satisfy the established USIJI program criteria.
- Facilitate implementation of 10-20 private or multi-lateral technology projects as a result previous year's efforts to verify the effectiveness of energy efficiency and renewable energy technologies deployed.
- U.S. agencies involved in world wide disaster relief successfully incorporate energy efficiency and renewable energy technologies into their standard practices.

Significant Accomplishments and Program Shifts

Pre-1998 Accomplishments

- The International Solar Energy Program identified 175 project opportunities for the renewable industry, valued at approximately $1.5 billion, and helped 16 projects secure outside funding totaling $200 million.
- The International Solar Energy Program assisted private industry primarily by providing technical and project assistance in instituting greenhouse gas emission mitigation projects in other countries to increase exports of U.S. technologies. Seven projects have been identified representing $40 million in private investment and built technical capacity, both domestically and internationally.

FY 1998 Accomplishments

- Accepted eight projects into the International Solar Energy Program which have established a baseline scenario representing 17.6 million metric tons of CO2 sequestered/displaced over the project life at an aggregate investment of $23.3 million by investor organizations.
- Co-sponsored five technical assistance and training activities in Canada, Japan, China, Malaysia, and South Africa.
- Ten projects implemented with technical assistance provided by the International Solar Energy Program.
- Provided technical assistance to four countries interested in participating in the U.N. Framework Convention on Climate Change and implementing a Joint Implementation Program.
- Provided technical assistance to 10 project developers in the areas of methodological development and implementation, assistance with obtaining financing, and in-country activities.
- Other efforts within the International Solar Energy Program were not funded in FY 1998.

FY 1999 Planned Accomplishments

- Accept 10 projects into the Joint Implementation Program which have established a baseline scenario representing 20 million metric tons of CO2 sequestered/displaced over the project life at a cost of $25 million.
- Co-sponsor three Joint Implementation/Clean Development Mechanism activities in Asia, Africa, and Latin America. These activities would include a variety of project development, technical assistance, and local training and institutional capacity building.
- Provide technical assistance to five countries interested in participating in the U.N. Framework Convention on Climate Change and implementing a Joint Implementation Program.
- Provide technical assistance to five project developers in areas of methodological development and implementation, assistance in obtaining financing, and in-country activities.
- Stimulate demonstration projects through market and trade development activities, including field validation, in Asia/Pacific, Latin America, Africa, and transition countries.

- Advance Energy and Environmental Security interests in up to 10 bilateral and multilateral negotiations or agreements.

FY 2000 Planned Accomplishments

- Provide technical assistance to developing countries interested in establishing Joint Implementation Offices or developing joint implementation projects.
- Provide technical assistance to U.S. companies and developing country participants in preparing projects for consideration as joint implementation projects.
- Undertake Market and Trade Development activities to reduce non-technical barriers (e.g, financing, resources, tariffs, and local prohibitions).
- Assist other agencies involved in disaster relief efforts in utilizing energy efficiency and renewable energy technologies to meet humanitarian and economic redevelopment needs of disaster stricken communities.
- Provide technical assistance to one-to-two disaster relief efforts which demonstrate the benefits of energy efficiency and renewable energy technologies in different settings.

FY 2001 - 2006 Planned Accomplishments

- Provide technical assistance to developing countries, U.S. companies, and others in estimating the climate impacts of joint implementation projects.
- Participate in international pilot projects testing carbon credit trading programs and the evaluation of the results.
- Participate with international organizations in drafting monitoring and verification protocols for measuring the actual carbon benefits from joint implementation projects.
- Adapt trade development activities to be appropriate for local cultural conditions in various regions with specific market needs.
- Implement effective agreements among U.S. agencies that provide rapid response to worldwide disaster relief utilizing energy efficiency and renewable energy technologies.

Program Completion

Completion of the Joint Implementation Program is anticipated when the instruments of the Kyoto Protocol have been established and accepted by the international community.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
USIJI	1,375	6,350	6,000	-350	-5.5%
Total, International Solar Energy Program	1,375	6,350[a]	6,000	-350	-5.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000

USIJI

- The FY 2000 request represents the refocused activities of the International Solar Energy Program and U.S. International Joint Implementation supporting Congressional direction to continue U.S. participation in Climate Change activities conditioned upon "meaningful participation" by developing countries. Support development and implementation of the U.N. Framework Convention on Climate Change's flexibility mechanisms to facilitate private sector project development in developing countries utilizing renewable energy, energy efficiency, and other "clean energy technologies." Technology cooperation activities also facilitate private sector deployment of these technologies. Conduct activities in support of national action plans in selected key countries for capacity building. Initiate process for developing methodologies needed for joint implementation projects and Clean Development Mechanism and emissions trading.

[a]The FY 1999 EWD appropriation was $1,375,000. An additional $2,600,000 provided as part of the FY 1999 Omnibus Consolidated Appropriation Act funding package will be allocated across the three program focus areas: Emerging Global Environmental and Energy Issues; Market and Trade Development; and Energy and Environmental Security. The total for the International Solar Energy Program is $6,350,000.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Focus on developing highly leveraged renewable energy field validation projects in order to educate regional energy decision makers on the benefits of U.S. technologies with a view toward replication using private sector and multi-lateral financing. Provide technical assistance to ongoing and prospective field validation projects in various regions to enhance lessons learned and probability of successful replication. Support technical and information dissemination assistance to multi-agency effort to mitigate effects of regional disasters worldwide	1,375	6,350	6,000
Total, International Solar Energy Program	1,375	6,350	6,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
USIJI	
■ The FY 2000 request for the International Solar Energy Program is greater than the amount provided by FY 1998 and FY 1999 EWD Appropriation. Although the FY 2000 request is slightly less than the amount provided from both the FY 1999 EWD appropriation and the Omnibus Consolidated Appropriation Act it will provide the amount of U.S. efficient and renewable technology deployment that the program would be able to facilitate as well as increase its ability to support U.S. national interests and policies.	-350
Total Funding Change, International Solar Energy Program	-350

National Renewable Energy Laboratory

Mission Supporting Goals and Objectives

Facility operations provide for the general purpose equipment purchases and for maintaining, upgrading, and constructing National Renewable Energy Laboratory facilities and infrastructure to assure continuity of research and integrity of effort in the conduct of research and development projects for Solar and Renewable Energy activities.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Facility Maintenance	1,000	3,900	1,100	-2,800	-71.8%
Construction	2,200	0	0	0	0.0%
Total, National Renewable Energy Laboratory	3,200	3,900	1,100	-2,800	-71.8%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Facility Maintenance			
■ **General Plant Projects (GPP) Funding**			
▸ NREL Infrastructure - Infrastructure renovations and upgrades at the NREL South Table Mountain (STM), and National Wind Technology Center (NWTC) sites. Work includes minor site modifications, patching, repair, and retopping of deteriorating roads and parking lots, safety fencing, landscaping, building metering, repair and replacement of leaking roofs, and the installation of a 2,000 square foot multi-user prefabricated facility for solar radiation research to replace dysfunctional shipping and storage containers currently being used.	1,000	1,869	750
■ **General Purpose Equipment (GPE) Funding**			
▸ Data Systems, NREL General - GPE activities to support the GPP project of the installation of data system infrastructure upgrades. Work includes the procurement and installation of critical Y2K compliance items such as upgraded telecommunications equipment and conversion of existing Novell software and hardware network to			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Microsoft Windows NT, upgrading the computer network backbone and the Wide Area Network, purchasing uninterruptable power supplies, and a Data Warehouse server.	0	2,031	0
▸ Provides for a variety of critical multi-program laboratory equipment to either upgrade the current capabilities at NREL or to replace equipment which has reached its serviceable life-span such as laboratory standards and calibration equipment, replacement of toxic gas monitors in laboratories, and liquid chromatograph-mass spectrometer.	0	0	350
Total Facility Maintenance.	1,000	3,900	1,100
Construction			
■ Field Test Laboratory Building (FTLB) Expansion, Phase III - This is the third phase of modifications to the Field Test Laboratory Building. This last phase provides for the design and construction of a 13,000 square foot conversion of existing space into research laboratories and outfitting new space for research support and includes exhaust ventilation, mechanical, and electrical utilities. The laboratories would support research related to the conversion of renewable energy resources to higher value fuels and chemicals.	2,200	0	0
Total, National Renewable Energy Laboratory.	3,200	3,900	1,100

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Facility Maintenance	
■ Facility maintenance is reduced $1,119,000 in GPP activities and $1,681,000 in GPE. The reduction of $1,119,000 in GPP is due to critical core infrastructure renovations and upgrades in FY 1999 ($1,869,000) and emphasis on a prefabricated 2000 square foot research facility in FY 2000 ($750,000). Facility maintenance is reduced $1,681,000 in GPE due to FY 1999 funding for the Data Systems Project ($2,031,000) and FY 2000 funding for basic laboratory equipment ($350,000).	-2,800
Total Funding Change, National Renewable Energy Laboratory	-2,800

Geothermal

Mission Supporting Goals and Objectives

Program Mission

The mission of the Geothermal Energy Program is to work in partnership with U.S. industry to establish geothermal energy as a sustainable, environmentally sound, economically competitive contributor to the U.S. and world energy supply.

Program Goals and Objectives

Working in close cooperation with its stakeholder community, the Geothermal Energy Program has developed a set of goals for the year 2010, as specified in the Geothermal Energy Strategic Plan (June 1998) which has been endorsed by U.S. Industry. These goals, include:

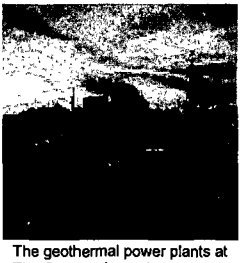
- Strategic Goal 1 — Electric Power Generation: Supply the electrical power needs of 7 million U.S. homes (equivalent to 10,000 MW of generation).
- Strategic Goal 2 — Direct Use Applications and Geothermal Heat Pumps: Supply the heating, cooling, and hot water needs of 7 million U.S. homes (equivalent to saving 4,000 MW of generation).
- Strategic Goal 3 — International Geothermal Development: Meet the basic energy needs of 100 million people in developing countries through sales of U.S. technology and services (equivalent to 10,000 MW of generation).
- Strategic Goal 4 — Science and Technology: Accelerate the development of U.S. geothermal science and technology to maintain world leadership.
- Strategic Goal 5 — Future Geothermal Resources: Develop new technology to meet 10 percent of U.S. non-transportation energy needs within the following 25 years.

A corollary technical objective is to reduce the levelized cost for geothermal electric power generation from the current $0.035/kWh to less than $0.03/kWh by the year 2010, a reduction of 25% from 1997 levels. This objective derives from Strategic Goal 1. Overall, the strategic plan contains some 18 objectives derived from the goals.

Strategic Approach

The Geothermal Energy Program directly supports four of the five goals of the DOE Comprehensive National Energy Strategy (1998): (1) Geothermal heat pumps will significantly increase energy efficiency in the building sector, including Federally-owned buildings. (2) Geothermal electricity will contribute 10,000 MW to the overall goal for renewables of at least 25,000 MW by 2010, while helping to promote energy production and use in ways that respect health and environmental values. (3) Enhanced Geothermal Systems technology offers an attractive, long-term option for an energy resource

that is extremely plentiful with few adverse effects. And (4) the Program expects to accelerate the deployment of clean, safe, and efficient geothermal systems around the world. The Department's Comprehensive National Energy Strategy supports the development of renewable technologies, such as geothermal energy, to increase domestic energy production in an environmentally-responsible manner.



The geothermal power plants at The Geysers in northern California.

The Program's R&D activities closely align with its mission and strategic goals. With improved exploration methods, industry will locate and characterize new geothermal fields more accurately, reducing the risk of development. Better technology for drilling wells will make it possible to access deeper resources and reduce costs, thereby expanding the economic resource base. Advances in energy conversion will establish air-cooled binary technology as a means of generating competitively-priced electricity from more plentiful lower-temperature resources. Studies of reservoir behavior will improve the management of geothermal fields, allowing fields to operate for over 100 years as sustainable commodities.

Geothermal electric generation projects are capital-intensive enterprises, with the major expenses being incurred before the plant begins to produce revenue. The high-cost components of a geothermal development project include (1) drilling of exploration, production, and injection wells, and (2) plant equipment and construction. The primary risk in a geothermal project is confirmation of a viable reservoir, which usually requires extensive drilling and well testing. To reduce the risks and costs in geothermal development, the Program's research strategy involves:

Southeast Geysers Effluent Pipeline Project

In late 1997, a novel project to generate electricity from treated wastewater began in Northern California. The geothermal industry and various government agencies, including DOE, joined forces to build the Southeast Geysers Effluent Pipeline. The pipeline project takes treated wastewater and uses it to produce additional steam at The Geysers, the largest geothermal power plant development in the world.

Labeled "environmentally superior," the project consists of a 29-mile, 20-inch diameter pipeline that carries 7.8 million gallons of water per day from the Lake County Sanitation District in Clearlake to The Geysers. At The Geysers, the secondarily-treated water is injected deep into the hot rocks that comprise the geothermal reservoir. The water boils into steam which is recovered by production wells and then used in turbine/generator machinery to generate electricity. The steam allows the generation of up to 70 megawatts of additional power.

Knowing where to inject the treated wastewater is important for maximizing steam production. DOE marshaled the resources of its national laboratories and other contractors to understand fluid flows and chemical interactions deep within the reservoir, thereby assisting industry in determining an optimum injection strategy.

A public/private partnership between the sanitation district representing the communities of Clearlake, Lower Lake, and Middletown, and three Geysers steam suppliers made the project a reality. This project successfully brought together the sanitation district, which was searching for a way to dispose of wastewater, and the steam suppliers, who needed additional sources of water for their depleted reservoir. Both Federal and state governments were instrumental in providing partial funding. The project was honored with three awards in 1998 the California State Association of Counties 1998 Challenge Award of Merit, the California Governor's 1998 Environmental & Economic Award of Recognition, and the Water Reuse Association of California 1998 Award of Merit.

- improving technologies for exploration, detection of fractures and permeable zones, well siting, and fluid injection;
- decreasing the cost of drilling and completing geothermal wells; and
- reducing the capital, operation, and maintenance costs of geothermal power plants.

The proposed activity level is sufficient to maintain geothermal R&D at a level of effort that results in continuous technology advances. A few new initiatives, such as the Geothermal Advanced Drilling System (GADS), may produce revolutionary changes which will accelerate development and use of geothermal resources, providing a reliable alternative source capable of supplying a significant fraction of the nation's energy needs.

The U.S. geothermal industry is too small to maintain independent research capabilities. Also, the international competition for geothermal power development projects is intense. The chief competition comes from Italy, Japan, and New Zealand, but other countries have become active as well. If the U.S. industry is to maintain its current world-leadership position, create new jobs, and help to expand the U.S. economy, assistance from the DOE Program is vitally important.

The proposed R&D program is based upon the Department's interaction with industry stakeholders and geothermal experts at universities and the national laboratories to develop a balanced portfolio of core (basic and applied) research, and well-focused technology development thrusts. The budget supports the five goals of the Geothermal Energy Strategic Plan. Cost-shared activities in reservoir technology, exploration, drilling, and energy conversion will leverage the R&D funds and facilitate technology transfer.

Annual royalties paid to the Government for geothermal power production on Federal lands exceed the Program's budget. For example, since 1995 the geothermal budget has averaged about $30 million, whereas royalty payments have exceeded $40 million annually. A recent study suggests that with continued development of geothermal resources those payments could double within 15 years.

Program Benefits

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.05	0.18	0.25
Energy Savings ($ Billions)	0.11	0.46	0.71
Carbon Displaced (MMTCE)	1.08	3.09	4.06

Scaled for the year 2004, these benefits correspond to supplying the electrical power needs of 2.5 million U.S. homes (3,300MW electricity generation capacity (MWe)) and 40 million people in developing countries using U.S. technology (4,000MWe).

Performance Measures

FY 2000 Performance Measures

- Complete a five-MW Kalina Cycle (advanced heat recuperation technology) demonstration geothermal power-plant.
- Complete laboratory evaluation of a direct contact condenser for binary cycles using mixed working fluids.
- Select one partner for demonstration of small-scale distributed power generation.
- Initiate development of high-temperature, "keep-a-live" battery prototype for powering electronic equipment in wells.
- Perform initial field test validating the usefulness of a high-speed data link for well drilling.
- In cooperation with the geothermal industry, complete testing and evaluation of three alternative methods for producing seismic energy for application to 3D seismic imaging of fractured geothermal reservoirs, and incorporate the best source technology in an exploration system to locate and characterize new geothermal fields.
- In joint DOE-industry projects, examine and assess a variety of chemicals for use as tracers for the flow of injected fluid through geothermal reservoirs, and confirm five new tracers that are environmentally compatible, stable at high temperatures, and detectable in minute quantities.

FY 2001 - 2006 Performance Measures

- Complete demonstration of economic benefits of a Kalina cycle in a geothermal power plant application.
- Complete demonstration of small-scale distributed power generation.
- Complete development and field testing of high-temperature, downhole fluid sampler.
- Initiate full scale validation and verification of a high-speed data link which will be ready for commercial use by 2006.
- Provide the geothermal industry with a scientific analysis of the effectiveness of 3D seismic surveys in the exploration for fractured geothermal reservoirs, and give guidance on the economic value of 3D seismic surveys versus other exploration methods.
- Through joint testing with industry, provide an evaluation of the borehole electromagnetic imaging tool to locate productive fractures in geothermal reservoirs and supply the computer algorithms for rapid and accurate interpretation to allow decisions to be made during drilling.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- Demonstrated the use of slimhole drilling for geothermal exploration, thereby reducing exploration drilling costs by 30 to 50% relative to standard 1995 technology.
- Developed the original design bases for polycrystalline diamond compact (PDC) drill bits. These were being used in about 40 percent of oil and gas drilling worldwide as of 1997.
- Developed technologies that achieved up to 10% improvements (relative to 1990 levels) in efficiency of power plants operating with high non-condensible gas concentrations (at The Geysers, CA) and with reduced brine temperatures (at Mammoth, CA).
- Increased annual installations of geothermal heat pumps by over 20% in 1997 through a collaborative public outreach effort with the Geothermal Heat Pump Consortium

FY 1998 Accomplishments

- Baker Hughes, a major drilling services company, signed a licensing agreement with Sandia National Labs for wireless telemetry technology to communicate with tools placed in wells up to two miles deep.
- Core-tube data logger was commercialized by Boart Longyear, a supplier of drilling equipment, for geothermal and mineral exploration activities.
- Completed conceptual design of an air-cooled trilateral cycle power module for village power applications.

FY 1999 Planned Accomplishments

- Complete development of specialized drilling equipment under the NADET program.
- Complete field test of insulated drill pipe with an industrial partner to provide much lower bottomhole fluid temperatures during drilling to increase tool life, improve drilling mud properties, and improve the operating environment for downhole electronics.
- Complete design and testing of three seismic source instruments to generate shear waves for geothermal 3-D seismic exploration.
- Complete design of a borehole electromagnetic logging tool to identify productive fractures.
- Field test improved-efficiency power generation technologies, including small-scale power modules, to increase electrical power output per pound of brine by 20%.
- Establish geothermal heat pumps as the technology of choice for schools, and install 10,000 units in Federal buildings.

FY 2000 Planned Accomplishments

- Complete improved injection techniques for proper fluid management in order to operate a geothermal field in a sustainable mode for over 100 years.

- Assist the U.S. geothermal industry, through cost-shared (50:50) field testing and evaluation research, in the development of two 40 megawatt power plants in the United States.
- Select an industrial partner for the cost-shared (50:50) development of an Enhanced Geothermal System at a working U.S. geothermal field.
- Evaluate the use of 3D seismic exploration methods to locate and characterize new geothermal fields through collaborative research with industry.
- Develop smart systems that integrate individual geophysical methods and provide a more reliable exploration target.
- Field test a new, innovative electromagnetic exploration tool to locate subsurface fractures.
- Complete field testing of improved PDC bits designed for hot, hard rock to double bit life and penetration rates thereby reducing well costs by about 5%.
- Complete a field test of a hard-wired, high-speed data link as a component of the Geothermal Advanced Drilling System to continually monitor and control drilling functions downhole.
- Complete development of high-temperature unshielded electronics and batteries for logging tools that will operate at temperatures exceeding 300°C.
- Complete construction of an 8MW Kalina cycle demonstration power plant that uses advanced heat recuperation technology. The non-Federal share of costs of this demonstration is over 60%. Advanced heat recuperation technology increases the energy conversion efficiency by about 20%, allowing the development of lower-temperature resources.
- Field test heat exchanger tube coatings that reduce fouling rates by 30%.
- Complete field tests of gas monitors that reduce plant operating and maintenance costs by over 5%.

FY 2001 - 2004 Planned Accomplishments

- Following the conclusion of 3-D seismic studies and development of borehole electromagnetic imaging technology to identify fractured geothermal reservoirs, exploration data from seismic, electromagnetic, geochemical, and geological investigations integrate into a comprehensive dynamic model of the geothermal reservoir.
- Building on the wireless data telemetry technology Sandia licensed to Baker Hughes in 1998, complete the high-speed diagnostics-while-drilling (DWD) system. This will greatly improve drilling operations while providing an additional 20% reduction in well costs.
- Conduct initial testing and evaluation of the Geothermal Advanced Drilling System combining state-of-the-art components.
- Incorporate the analytical tools developed with the completion of the improved injection technology for sustainable field operation in FY-2000 into an innovative technique for numerical modeling of geothermal reservoirs.
- Create an Enhanced Geothermal System at a geothermal field with an industrial partner.

- Following commercial-scale testing of the Kalina Cycle (ammonia-water system), initiate testing of advanced binary power plants using mixed working-fluid cycles.
- Initiate new cost-shared direct use applications systems to evaluate innovations that reduce operating and maintenance costs.

FY 2000 Program Shifts

- The Enhanced Geothermal Systems (EGS) initiative will focus on extending the productivity and lifetime of geothermal reservoirs through rock fracturing and stimulation techniques. In addition to extending the lifetime of existing geothermal fields, EGS technology will expand the U.S. geothermal resources available for utilization.
- The new Geothermal Advanced Drilling System (GADS) initiative is a systems approach to reducing drilling costs for drilling in deep, hot, hard rock environments. In conjunction with EGS, GADS will give economic access to geothermal resources contained in rocks at great depth.
- The new Modular Power Systems initiative will begin development of a small-scale power module for the production of electricity at distributed or off-grid sites. Many small-scale power modules eventually will be installed worldwide as a result of this initiative.

Program Completion

The Strategic Plan for the Geothermal Energy Program is based on the assumption that, given the necessary resources, the Program will be completed in 2010. Certain elements are expected to end sooner, such as Geothermal Heat Pump Deployment (2000). The Program goals and their associated objectives as specified in the Strategic Plan will be achieved in partnership with industry and other stakeholders to create technology that reduces the cost and risk of producing all forms of geothermal energy.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Geothermal Electric R&D	22,294	22,000	29,500	+7,500	+34.1%
Geothermal Heat Pumps	6,400	6,500	0	-6,500	-100.0%
Total, Geothermal	28,694	28,500	29,500	+1,000	-66.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Geothermal Electric R&D			
■ **Reservoir Technology** - The program will perform water injection test at a commercial site at Dixie Valley, develop a suite of chemical tracers for tracing the flow of injected water and use field test data to improve reservoir models. Industry is cost sharing the field testing of tracers and reservoir model improvements. These efforts will lead to proper fluid management which will allow a geothermal field to operate in a sustainable mode for over 100 years. Research in support of the proposed Santa Rosa pipeline to The Geysers will be conducted. Initiate the Enhanced Geothermal Systems (EGS) initiative will focus on extending the productivity and lifetime of geothermal reservoirs. The EGS initiative calls for conducting a large-scale stimulation, water injection, and circulation experiment at an operating U.S. geothermal field. With industry cooperation and support in the form of cost sharing, this effort will accelerate the use of EGS in the U.S. by at least five years and restore the U.S. as a world leader in EGS technology development. The funding is appropriate to support joint DOE/industry R&D critical to sustaining improvements in maintaining the U.S. technology.	4,387	5,500	8,000
■ **Exploration** - Finding and assessing a viable resource is the stage of geothermal development with the highest risk. Greater effectiveness in locating geothermal resources will reduce the number of non-productive wells that are drilled. The program will evaluate through field testing various 3D seismic exploration strategies. Neural networks for integrating geophysical methods will be evaluated, followed by smart systems using the best neural network. The funding is appropriate as it directly supports the Geothermal Strategic Plan goal of developing future geothermal resources.	5,600	5,500	7,000
■ **Drilling Technology** - The drilling of wells constitute up to one half of the cost of a geothermal power plant. The program will complete the testing of improved PDC bits, unshielded high-temperature logging tools, and a high-temperature casing inspection tool. A successor to the National Advanced			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Drilling and Excavation Technologies (NADET) program, the Geothermal Advanced Drilling System will be initiated in order to insure that drilling costs that increase linearly with depth as opposed to the exponential increases that exist today. Thus, the huge geothermal resources contained in rocks at great depth will become economically accessible. One element of the Geothermal Advanced Drilling System is a high speed data link that will transmit a variety of real-time drilling data to the surface for decision making during operations. This data stream will be of great benefit to drillers and will allow faster, cheaper drilling. About 50% of the cost of the high-speed datalink system will be provided by major private sector partners and most other projects have same level of cost-sharing by industry partners. Based on DOE's interactions with the U.S. geothermal industry, the funding is appropriate for the high priority of reducing drilling costs.....	6,900	5,000	7,500
■ **Energy Conversion Technology** - The Kalina Cycle, a new plant design for more efficient and cost effective electrical generation will be tested in partnership with Exergy, Inc. Construction of this demonstration of advanced heat recuperation technology will be completed. The non-Federal share of costs of this demonstration is over 60%. Based on prior technology assessments performed by national laboratories, a cost sharing partner for demonstration of a small-scale geothermal power module will be competitively selected. Modular geothermal power plants offer flexibility in deployment, allowing less risky, incremental development of a geothermal field. Some geothermal fields are located on the fringes of existing power grids where modular, small-scale geothermal power plants can maintain voltage levels and provide other valuable power quality assistance. Modular geothermal power plants can also support mini-grids in remote applications. The funding is appropriate for continuation of this important R&D and achieving the goals in the Geothermal Strategic Plan.	5,119	6,000	7,000
■ **Ocean R&D** - Completed tests of energy conversion system at Keahole Point, Hawaii.	288	0	0
Total, Geothermal Electric R&D.	22,294	22,000	29,500

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Geothermal Heat Pumps			
■ In response to a consensus of industry stakeholders, the program will penetrate 2-4 additional target markets each with several thousand GHP installations annually. The non-Federal share of costs of these demonstrations will be over 66%. In partnership with DOE's Federal Energy Management Program, Federal agencies will install 10,000 GHPs at no capital cost through Super Energy Savings Performance Contracts. No activities are planned beyond FY 2000.....	6,400	6,500	0
Total, Geothermal.....	28,694	28,500	29,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Geothermal Electric R&D	
■ The increase supports new initiatives in reservoir technology, advanced drilling and energy conversion designed to allow the U.S. to retain its leadership in technology development while making the best economic use of the large geothermal energy resource.....	+7,500
Geothermal Heat Pumps	
■ The decrease in funds reflects the decision to withdraw Federal support and let market forces determine the extent to which this technology succeeds.....	-6,500
Total Funding Change, Geothermal.....	+1,000

Hydrogen Research

Mission Supporting Goals and Objectives

Program Mission

The mission of the Hydrogen Research and Development program is to enhance and support the development of cost competitive hydrogen production and storage technologies, and provide for integrated systems. Hydrogen can serve as an energy carrier that can reduce adverse environmental impacts, improve national security, by facilitating the penetration of renewable energy resources into the U.S. energy mix.

Program Goals and Objectives

Over the next five years, hydrogen is expected to make a significant penetration in several niche markets as concerns increase for energy security and global climate change. The Proton Exchange Membrane (PEM) fuel cell is the primary technology that will advance hydrogen into these niche markets and eventually into more mainstream applications such as large-scale electricity generation and transportation. The Hydrogen Program will cost-share the introduction of new hydrogen-based technologies to: provide distributed electrical generation; reduce the use of petroleum; increase the use of domestic energy resources; and increase the efficiency of, and reduce emissions from, existing fossil energy systems.

Development of critical technologies to lower the cost of hydrogen production, storage and utilization is vital for the introduction of hydrogen into the energy infrastructure. The Program facilitates the introduction of these technologies in high priority areas -- such as renewable/hydrogen electric generation systems, refueling stations for hydrogen vehicles and electricity for Native American villages and other remote locations. These crucial activities reduce dependency on expensive oil products, promote rural electrification, and economic development, and use grid-independent systems, while reducing NOx, SOx, and CO_2 emissions. These areas are goals outlined in the DOE Strategic Plan: (1) Objective 1, Strategy 4 to develop alternative transportation fuels and more efficient vehicles that can reduce year 2010 projected oil imports; (2) Objective 2, Strategy 3 to develop renewable energy technologies and supporting policies capable of doubling non-hydroelectric renewable energy generating capacity; and (3) Objective 3, Strategy 2 to increase the efficiency and productivity of energy use by 2010, limit energy related releases of NOx, SOx, and CO_2, and particulates, and other wastes by as much as 5 percent relative to projected emissions.

The Core Research and Development effort will:

- Achieve hydrogen production costs of $12.00 - $15.00 per million Btu for pressurized hydrogen from natural gas and biomass when systems are produced in quantity;
- Develop safe, low-cost, hydrogen storage technology for on-board a vehicle to achieve a 350 mile range; and safely store hydrogen on vehicles to achieve 350 mile range; and
- Develop a reversible fuel cell at <$600/kW when systems are produced in quantity.

The Technology Validation effort will:

- Install a wind/reversible fuel cell in a remote Arctic location;
- Install distributed refueling stations that demonstrate co-production of hydrogen and electricity from natural gas. The hydrogen will be less than $1.20 per gallon equivalent and an electricity production cost less than $0.06 per kWh when systems are produced in quantity; and
- Install a liquid-fueled PEM fuel cell for remote and village power applications.

Strategic Approach

The Hydrogen Program utilizes the core competency of the National Laboratories, universities, and industry to develop and demonstrate the processes and technologies needed to produce, store, transport, and utilize hydrogen safely in various applications. Reduction of greenhouse gases is a major emphasis of the Hydrogen Program, consistent with the objectives of the DOE Strategic Plan. Major initiatives in the Program to meet these objectives include: (1) the transitional use of natural gas as the feedstock for the production of hydrogen while renewable resource technology is under development; (2) the introduction of PEM fuel cells for cogeneration systems integrated with natural gas reformers; (3) the development of codes and standards to ensure the safest technologies are produced and ready for market penetration; and (4) the use of domestic resources to produce hydrogen as a future energy carrier.

To achieve its mission, the hydrogen program has four strategies: (1) expand the use of hydrogen in the near-term by working with industry, including hydrogen producers, to improve efficiency, lower the emissions, and lower the cost of technologies that produce hydrogen from natural gas and to introduce renewable-based production options; (2) work with fuel cell manufacturers to develop hydrogen-based electricity storage and generation systems that will enhance the introduction and penetration of distributed, renewable-based utility systems; (3) coordinate with the Department of Defense and DOE's Office of Transportation Technologies to demonstrate safe and cost-effective fueling systems for hydrogen vehicles in urban non-attainment areas and to provide onboard hydrogen storage systems; and (4) work with the National Laboratories to lower the cost of technologies that produce hydrogen directly from sunlight and water.

The FY 2000 request continues to implement the program outlined in the Department's Hydrogen Multiyear Plan and recommended by the Hydrogen Technical Advisory Panel (HTAP) report, including increased collaboration with the Office of Fossil Energy (FE) and the Office of Science (formerly the Office of Energy Research). The Program has already initiated one co-funded project with FE in advanced reforming for the production of "syngas," a blend of carbon monoxide and hydrogen. The syngas is used by the "Gas to Liquids Program" to produce new liquid fuels while the Hydrogen Program is using the technology for distributed production systems at refueling centers. The Hydrogen Program is pursuing other technologies, such as producing hydrogen from low rank coal with integrated carbon sequestration, or producing high-value carbon products in cooperation with FE's Vision 21 plan.

The market conversion to widespread hydrogen is a long-term option which requires the development and introduction of a number of critical technologies. These include low-cost, high-density storage systems, low-cost PEM fuel cells, and small load-following reformers for distributed production systems. This technology has received a major boost due to three ihdustry-led developments: the

Daimler Benz and Ballard joint venture to produce fuel cell vehicles by 2004; the Plug Power joint venture to produce hundreds of natural gas reformer/ PEM fuel cell systems for home cogeneration; and General Public Utilities' joint venture with Ballard to produce 250 kWe PEM fuel cells by 2002. These activities are providing market pull to other manufacturers of hydrogen energy systems. Increased hydrogen activity will open up markets for renewable technologies, such as wind and photovoltaics, by providing energy storage options.

Program Benefits

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.09	0.60
Energy Savings ($ Billions)	0.00	0.10	1.63
Carbon Displaced (MMTCE)	0.07	1.35	9.31

The estimated benefits are based on a contribution of hydrogen fuel cells to the Nation's future electricity generation mix. Hydrogen fuel cells are expected to account for 36 GW, a 4.2% share of the projected U.S. total power by the year 2020. If this Program is implemented as proposed, the Renewable Energy Penetration Model projects installation of an additional 21 GW of fuel cells between 2016 - 2020, which equates to 27% of all new electric capacity in the U.S. This 57 GW of electrical generation can provide enough power to support a city of 10 million homes and businesses.

Performance Measures

FY 2000 Performance Measures

- Demonstrate a 3-fold increase in hydrogen production from biologically catalyzed process.
- Demonstrate 600 mAmps per square centimeter at 0.5 volts in a low-cost manufactured stainless steel PEM fuel cell configuration.

FY 2001-2006 Performance Measures

- Demonstrate carbon dioxide free production of hydrogen using a plasmatron (electric torch) at a scale of 30 kW.
- Demonstrate Ion Transport Membrane technology at 10kW for applications at a distributed production facility.
- Construct a pilot plant for fabrication of carbon nanostructures for 4 percent hydrogen by weight storage.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

Over the last three years, the Hydrogen Program has had significant programmatic and technical accomplishments towards meeting its goals. These include:

- Researchers have been granted over 18 patents.
- Four researchers have been named Distinguished Scientists, by the American Institute of Chemical Engineers, the American Chemical Society, the Columbus Award, and the President's Award.
- NREL researchers have demonstrated: (1) a triple junction semiconductor for splitting water with a measured solar to hydrogen efficiency greater than 12.5%. (Prior to this the highest recorded efficiency was 7.3%.) (2) A biologically catalyzed water gas-shift catalysis process with over 90% conversion of carbon monoxide to hydrogen was demonstrated.

FY 1998 Accomplishments

- Completed Technology Roadmaps for the Core R&D Program, Technology Validation, and Analysis and Outreach activities that define the goals and objectives to be accomplished over the next five years. This activity is a key part of a deliverable for the Report to Congress due in January 1999.
- At the University of Hawaii, a state-of-the-art bioreactor was installed in a collaborative project with the Japanese and Italians to produce hydrogen using microalgae.
- An innovative PEM fuel cell constructed of stainless steel was tested at atmospheric pressure and temperature for over 2000 hours without any degradation of performance.
- Completed the prototype of a low-cost thick film solid state hydrogen sensor.

FY 1999 Planned Accomplishments

- Initiate a resource assessment for the Montana Trade Port Authority for the construction of a solid waste hydrogen fuel cell manufacturing facility.
- Successfully operate a 50kW renewable hydrogen refueling station at Sunline Transit in the City of Palm Springs.
- Issue a solicitation for the construction of a refueling station to be built in Nevada to service Las Vegas.
- Operate a cryogenic gas tank for vehicle storage to support a 400 mile range configuration for 100 refilling cycles.
- Complete scale-up of Sorbent Enhanced Reformer concept and perform economic analysis of system used for central generation of hydrogen.
- Demonstrate a photochromic method for rapidly identifying algae that will produce hydrogen from water, without being inhibited by by-product hydrogen.
- Three Alaska Remote Power activities will be initiated: an integrated wind/reversible fuel cell system for a remote village to be tested at the University of Alaska; an arctic lab at the University of

Alaska; and a project to be initiated on a fuel cell power system (known as autothermal reformer) that uses diesel oil to produce hydrogen for a residential fuel cell.

- Complete the feasibility study on the Montana Trade Port Authority.

FY 2000 Planned Accomplishments

- A new metal hydride complex (alanates) has been developed with a hydrogen capacity in excess of 5% by weight and energy storage efficiency greater than 74% and will be demonstrated in a system.
- Successfully operate a reversible fuel cell with 60% round-trip efficiency in a remote Arctic application.
- Operate a quick-fill refueling station to be built in Nevada to service Las Vegas shuttle buses, and Nevada Test Site and Nellie Air Force Base vehicles.
- Achieve long-term stability of catalysts for carbon monoxide.
- Demonstrate a 3-fold increase in hydrogen production at 15 atmospheres using photosynthetic bacteria for the water gas shift reaction.
- Demonstrate over 90% absorption of carbon dioxide in a dual bed Sorbent enhanced reformer reactor used for hydrogen production.
- Demonstrate a solar-to-hydrogen efficiency greater than 12% for a III-V tandem cell and greater than 8% for amorphous silicon photoelectrochemical systems.
- A lightweight tank will be fabricated to validate a new class of magnesium-based metal hydrides with 4.5% by weight storage at a dehydriding temperature of 150° C.
- Demonstrate improved catalyzed hydride concept.
- A solicitation will be issued for innovative ideas, components, and concepts for compression and storage systems for both stationary and mobile applications.
- Demonstrate a fiber optic sensor using tungsten oxide to indicate hydrogen leaks in a vehicular application.
- Demonstrate PEM fuel cell performance of 600 mAmps per square centimeter at .5 volts for a metal separator plate configuration.

FY 2001 - 2004 Planned Accomplishments

- Successfully operate for three months the carbon dioxide free production of hydrogen using a plasmatron (electrical torch) at a scale of 30kWe.
- Demonstrate a 1kWe solid oxide fuel cell with integrated natural gas reformer for one year.
- Operate a single-stage 150 square meter photobiological reactor to produce hydrogen from water using oxygen tolerant mutants.
- Successfully deploy and operate small liquid fueled reformer/PEM fuel cells in an arctic environment.

- Install advanced refueling stations for fleets of vehicles that demonstrate the ability to provide hydrogen at $1.00/gallon equivalent and electric power at $0.05/kWh for mass-produced systems.
- Successfully operate a pilot plant for a biological water gas shift catalyst using reformed biomass for one year.
- Demonstrate 8% efficiency for hydrogen production and greater than 3,000 hours operation in an outdoor photoelectrochemical system using amorphous silicon.
- Successfully operate for one year an advanced chemical hydride fuel refueling station to service fleets of hydrogen vehicles. Install advanced chemical hydride storage tanks on vehicles.

Program Completion

The program will be completed in FY 2020 after the following strategic objectives have been achieved:

- FY 2002 - Non-energy (capital and operating) cost of electricity from hydrogen-based storage systems will be lowered to $0.05/kWh. Plant cost of renewable hydrogen produced at atmospheric pressure, from sunlight and water not using electrolysis will be reduced to$9.00-$15.00/MMBtu. The cost of hydrogen delivered to a vehicle at pressure will be reduced to $12.00-$15.00/MMBtu when systems are produced in quantity.
- FY 2008 - Hydrogen use increases from 0.3Quad/yr (as a chemical feedstock to produce reformulated gasoline), to 0.4Quad/yr (as a transportation fuel and chemical feedstock).
- FY 2010 - Deployment of new hydrogen production technologies to convert natural gas for fuel cell applications will reduce emissions by: 61,000 tons per year NOx, 1,000,000 tons per year CO, and 46 million tons per year CO_2. Hydrogen-based systems will begin to displace fossil fuels in utility, building, and vehicle applications leading to 0.1Quad/yr .
- FY 2020* - Hydrogen-based systems will begin to displace fossil fuels in utility, building, and vehicle applications leading to 1 Quad use.
- Renewable energy based hydrogen production will contribute the equivalent of 10Quad/yr in the primary energy market.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Core Research and Development	6,975	9,088	14,100	+5,012	+55.1%
Technology Validation	6,361	10,993	11,420	+427	+3.9%
Analysis and Outreach	2,470	2,169	2,480	+311	+14.3%
Total, Hydrogen Research	15,806	22,250	28,000	+5,750	+25.8%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Core Research & Development			
■ **Thermal Processes** - Support will be provided for installation and operation of two process development units to demonstrate production of hydrogen, one using biomass and one using natural gas. Performance characteristics will be determined. Research will be supported for fabrication and operation of a 6kW integrated plasma reformer, for operation and performance characterization of a supercritical biomass gasification reactor, development of a liquid fueled reformer, and for the manufacture of ion transport membrane reactor technology in a collaboration with the Office of Fossil Energy.			
The funding level is appropriate and was derived through past experience and evaluation by experts in a peer review of on-going efforts. This is linked to the goals and objectives outlined in the R&D Technology roadmap.	2,957	4,559	5,880
■ **Photolytic Processes** - Research will be supported to genetically engineer marine algae to split sea water to hydrogen and oxygen, for fabrication of a modular photo electrochemical production cell, lifetime testing of high efficiency coated cells, developing higher efficient multijunction amorphus silicon semi-conductors, and the operation and design of a process development unit to biochemically react waste carbon monoxide to produce hydrogen at near 100% efficiency using an engineered strain of microbes.			
The Hydrogen Program in conjunction with the National Science Foundation, conducted a Peer Review of the renewable-based production technologies. This information provided the most important tool to determine if the funding levels requested were appropriate. Through analysis, the experts determined the funding level was appropriate to meet the goals outlined in the R&D Technology roadmap.	1,780	1,700	2,630

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Storage** - Develop technology for the continuous production of carbon based hydrogen storage materials including nanotubes, for fabrication of four lightweight metal hydride storage modules, for fabrication of an integrated reformer into a vehicle, and for the validation of advanced pressurized gas storage technologies. The funding level was determined through project reviews with program participants to provide on-board hydrogen storage systems for vehicles and for distributed generated systems to support the collaboration with the Office of Transportation Technologies.	1,848	1,829	3,090
■ **Utilization** - Develop end-use technologies, sensors, and other processes that can effectively use the system advantages of converting chemical energy to electrical energy. The program co-funds and co-manages these projects in collaboration with the DOE Office of Transportation Technologies' Fuel Cell Program. The following technologies are included: PEM fuel cell and reversible fuel cell technologies, internal combustion engines, hydrogen detectors and measurement sensors. Support will be provided for the prototype design, fabrication and field testing of a newly developed solid-state hydrogen leak detectors; for development of a 50kW scaleable modular PEM fuel cell readily adaptable to inexpensive mass production; and for fabrication of a 25kW fuel cell for integration into a small stationary power system. The funding level is based on extensive experience with the development of PEM fuel cells and sensors to meet key programmatic milestones for demonstrating safe end-use systems	390	1,000	2,500
Total Core Research and Development.	6,975	9,088	14,100
Technology Validation			
■ Install and demonstrate several solar and wind/reversible hydrogen generation and storage fuel cell systems and confirmation of the economic viability of these systems for remote and on-grid utility applications.	1,500	2,524	2,765

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Install and demonstrate liquid fuel cell (PEM) systems for use in a remote village in an arctic environment.	0	2,823	3,030
■ Demonstrate technologies for hydrogen infrastructure for fueling of hydrogen vehicles. The later activity will include work initiated in FY 1999 for a natural gas based refueling station to be located in Nevada to service a fleet of vehicles with advanced hydride and cryo-pressure tanks installed.	1,261	2,675	5,625
■ Broad based solicitation for storage systems on vehicles.	600	0	0
■ Initiated Russian American Fuel Cell Consortium Projects. .	3,000	0	0
■ Fabricate high-pressure hydrogen storage tanks for vehicles. Complete the construction of one joint-venture renewable hydrogen venture.	0	2,971	0
The level of funding requested for technology validation activities was determined by analysis of individual component technologies to provide a hydrogen fueling station, on-board hydrogen storage for vehicle validation projects, three PEM fuel cell systems for distributed remote power projects, and a 100kW reversible fuel cell system for an arctic environment. Prior experience and contractor proposals were used in this assessment.			
Total, Technology Validation.....	6,361	10,993	11,420

Analysis and Outreach

■ Conduct economic analyses and technical assessments for technologies being developed and demonstrated, in addition support will be provided for similar studies on hydrogen systems involving technologies from production to end use, to provide insight into the applications most likely to be commercially viable and identify areas of further needs in R&D and technology validation. Initiate resource assessment in Montana to determine feasibility of a solid waste hydrogen fuel cell manufacturing facility in the community. Continue development of educational materials

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
including an interactive CD ROM for middle and high school students, a curriculum module to teach chemistry on the basis of hydrogen and the environmental impact of fuels, and the production of an adult educational film on hydrogen use in energy applications, as well as several topical films.			
The funding level is appropriate as determined by the Secretary's Hydrogen Technical Advisory Panel and by the Program's Peer Review Team.	2,470	2,169	2,480
Total, Hydrogen Research	15,806	22,250	28,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Core Research and Development	
■ **Thermal Processes** - The Program will fully fund two thermal conversion processes that produce hydrogen from natural gas with a 20-30% increase in efficiency over conventional processes; and one award to integrate the biologically catalyzed water gas shift process to a pyrolysis reactor to verify process performance.	+1,321
■ **Photolytic Processes** - The Program will award multiple cooperative agreements; at least one award to integrate the new strains of algae into a bioreactor system for process development and characterization; one award to scale-up photoelectrochemical processes to characterize the materials performance and engineering requirements.	+930
■ **Storage** - The Program will award at least one project to complete the characterization of the family of new metal hydride materials to reduce the pyrophoric sensitivity of the alloys; and at least one award to assemble carbon absorbents into a laboratory scale storage system for characterization and demonstration.	+1,261
■ **Utilization** - The Program will fund the prototype design, fabrication and field testing of newly developed solid state hydrogen leak detectors; and for fabrication of a 25kW fuel cell for integration into a small stationary power system.	+1,500
Total, Core Research and Development	+5,012

	FY 2000 vs. FY 1999 ($000)
Technology Validation	
■ The Technology Validation Program will award cooperative agreements for additional stand-alone power generation systems using proton exchange membrane fuel cells to produce electricity and generate hydrogen.	+427
Analysis and Outreach	
■ The Analysis and Outreach Program will award a cooperative agreement for the production of an educational video on hydrogen technologies and complete the resource assessment in Montana.	+311
Total Funding Change, Hydrogen Research and Development Program.	+5,750

Hydropower

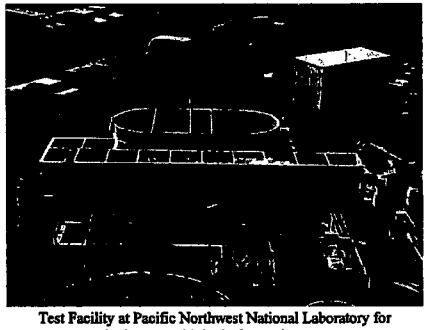
Mission Supporting Goals & Objectives

Program Mission

The mission of the U.S. Department of Energy's Hydropower Program is to improve the technical, societal, and environmental benefits of hydropower resources by conducting collaborative research and development with industry and other Federal agencies.

Program Goals and Objectives

Working with industry and other Federal agencies, the Hydropower Program's research and development activities will provide a biological and engineering basis for a new generation of hydropower turbines. Successful development will reduce turbine-induced fish mortality to 2% or less, compared to current levels ranging up to 30% or greater, and maintain dissolved oxygen levels of at least 6 mg/liter, ensuring compliance with water quality standards. This program addresses the goal stated in the Comprehensive National Energy Strategy (CNES) "to promote energy production and use in ways that respect health and environmental values - improving our health and local, regional and global environmental quality." To meet this goal, one of the strategies proposed in the CNES is to "maintain the viability of existing hydropower sources". Specifically, CNES states that "the development of advanced hydropower turbines to repower existing dams has the potential to avoid some of the environmental challenges posed by conventional hydropower plants and extend the life of existing hydropower plants to help preserve their contribution to U.S. energy production."



Test Facility at Pacific Northwest National Laboratory for hydropower biological experiments.

Strategic Approach

Hydropower currently generates about 10% of the nation's electricity. However, existing generation is in jeopardy, due to a combination of real and perceived environmental problems, regulatory complexity and pressures, and changes in energy economics. New hydropower resources are often not being developed for similar reasons. Current hydropower technology, while essentially emission-free, can have undesirable environmental effects such as fish injury and mortality from passage through turbines and the alteration of downstream water quality and quantity. Incorporation of advanced turbine technology could provide estimated capacity improvements of 4,000MW at existing federal facilities, 1,300MW at existing non-Federal facilities requiring relicensing over the next 12 years, and 4,800MW of new capacity.

In FY 2000 the program will complete the proof-of-concept testing of an innovative design selected through a competitive bidding process. Biological performance will be determined and test results provided to industry. Experiments to establish biological performance criteria will continue, providing biologists and engineers with quantitative data on fish behavior and response in the turbine environment. Final engineering designs for turbines with advanced features to improve dissolved oxygen conditions will begin.

The DOE program is intended to develop hydropower technology with wide applicability. Much of the research presently carried out by Federal hydropower operators, as well as utilities, is site-specific, addresses specific environmental and equipment problems, and has limited general applicability. Moreover, with deregulation utilities are beginning to reduce their research activities, and utility organizations which sponsor R&D are losing membership and cannot maintain these activities at previous levels. Research funded by the few US manufacturers is aimed at minor improvements to the product line, is usually proprietary, and for that reason again lacks general applicability.

Program Benefits

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.01	0.08	0.18
Energy Savings ($ Billions)	0.02	0.20	0.53
Carbon Displaced (MMTCE)	0.15	1.35	3.00

Performance Measures

FY 2000 Performance Measures

- Proof-of-concept testing of advanced turbine conceptual design completed in FY 2000; biological performance predictions verified and test results provided to industry.

FY 2001-2006 Performance Measures

- Completion of full-scale advanced turbine prototype testing in FY 2005, successfully demonstrating the capability of maintaining dissolved oxygen levels of 6 mg/liter.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

- Completed conceptual designs for advanced turbines.

FY 1998 Accomplishments

- Hydropower resource assessments completed for all 50 states, providing a more accurate estimate of viable undeveloped hydropower potential (~30,000MW).
- Conducted laboratory biological studies of the effects of shear stresses on turbine-passed fish.

FY 1999 Planned Accomplishments

- Begin proof-of-concept testing of advanced turbine conceptual design to verify predicted biological performance.
- Begin design of instrumentation for real-time visualization and accurate simulation of fish passing through turbines

FY 2000 Planned Accomplishments

- Complete proof-of-concept testing of conceptual turbine design.

FY 2001-2004 Planned Accomplishments

- Complete experiments to establish biologically-based performance criteria for advanced turbine design.
- Complete final engineering designs for turbines with advanced dissolved oxygen features; begin model fabrication and testing.
- Complete model testing of turbines with advanced dissolved oxygen features.
- Complete design of fish passage visualization/simulation instrumentation.
- Complete final engineering designs for turbines with advanced fish passage features.
- Complete model testing of turbine designs with advanced fish passage features.

Program Completion

Program completion is envisioned for the 2008 time frame assuming levels of funding sufficient to achieve the successful demonstration of biological performance of advanced hydropower technology.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Advanced Turbine Research and Development	729	3,250	7,000	+3,750	+115.4%
Total, Hydropower	729	3,250	7,000	+3,750	+115.4%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Advanced Turbine Research & Development			
■ Complete the pilot-scale laboratory proof-of-concept testing of the conceptual design to verify biological criteria and predicted biological performance using live fish. The funding level is based on previous turbine research efforts and anticipated laboratory in-house costs.	0	2,170	2,500
■ Complete the biological experiments and instrumentation development to establish biologically-based performance criteria required for advanced turbine development. The funding level is based on account experience the funding level requested is considered adequate.	729	1,080	2,500
■ Initiate competitively-selected cost-shared engineering design of turbines with advanced dissolved oxygen features. As the engineering design phase is a pre-commercialization activity, cost-sharing of at least 20% will be a requirement in the competitive solicitation. Experience with the competitive solicitation in the conceptual design phase demonstrated the limited ability of industry to cost-share in pre-commercialization activities. The full-scale prototype testing phase planned for FY 2002 will require at least 50% cost-sharing. It is anticipated that turbine manufacturers responding to a solicitation for this phase will be teamed with a developer in order to achieve this level of cost-sharing. The funding level is based on previous experience, anticipated in-house laboratory efforts and expected level of cost-sharing.	0	0	2,000
Total, Hydropower.	729	3,250	7,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Advanced Turbine Research & Development	
■ Completion of proof-of-concept testing begun in FY 1999.	+300
■ Completion of biological experiments and continued development of turbine passage visualization/simulation instrumentation.	+1,420
■ Engineering design phase of the dissolved-oxygen turbine research and development which is aimed at improving dissolved oxygen concentrations in discharged water to at least 6mg/liter.	+2,000
Total Funding Change, Hydropower.	+3,750

Renewable Indian Energy Resources Program

Mission Supporting Goals and Objectives

The FY 1998 and FY 1999 Energy and Water Development Appropriations Report language for Solar and Renewable Energy designated funding for supporting the construction of hydropower and related projects under the Renewable Indian Energy Resource. No funding is requested for any additional activities in FY 2000. Instead, DOE proposes to integrate this program's activities with that of the Federal Buildings/Remote Power line item and create a single, competitive-based, geographically and technologically diverse competitive solicitation program addressing American Indian energy needs. (This program would fall under the Solar Program Support line item).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Renewable Indian Energy Resources	3,939	4,779	0	-4,779	-100%
Total, Renewable Indian Energy Resources	3,939	4,779	0	-4,779	-100%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Renewable Indian Energy Resources Program			
■ Eyak Native Corporation Power Creek Hydroelectric Project: Incremental funding was awarded on this 6-mw project, located near Cordova, AK; start-up estimated for March 1999.	1,939	1,243	0
■ Old Harbor Hydroelectric Project: A grant was awarded for project construction of this 335-kW project on Kodiak Island, AK.	800	383	0
■ Upper Lynn Canal Regional Intertie: A grant was awarded for project construction of this 35-Kilovolt submarine cable.	1,000	123	0
■ Scammon Bay Hydroelectric Feasibility Studies: A grant was awarded to conduct feasibility studies for hydropower development.	100	15	0
■ Contruction of Pyramid Creek Hydroelectric Project (600 kW, located on Unalaska Island, AK.	0	1,000	0
■ Contruction of Sitka Diesel Backup System.	0	1,000	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Competitively award Native American solicitation for off-grid and grid compatible projects on Native lands.	0	1,000	0
■ DOE monitoring and technical assistance.	100	15	0
Total, Renewable Indian Energy Resources Program.	3,939	4,779	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Renewable Indian Energy Resources Program	
■ No funding is requested for any additional activities in FY 2000. Instead, DOE proposes to integrate this program's activities with that of the Federal Buildings/Remote Power line item and create a single, competitive-based, geographically and technologically diverse competitive solicitation program addressing American Indian energy needs. (This program would fall under the Solar Program Support line item).	-4,779
Total Funding Change, Renewable Indian Energy Resources Program	-4,779

Electric Energy Systems and Storage

Mission Supporting Goals and Objective

Program Mission

Transmission Reliability - The mission of the Transmission Reliability Program is to develop technologies and policy options that will maintain and improve the reliability of the nation's electricity delivery system during the transition to competitive power markets.

High Temperature Superconducting R&D - The Department leads the national effort to capture the energy savings potential of superconductivity - the ability of certain materials to be high capacity carriers of electricity without having the resistance losses inherent in normal conductors, such as copper. The mission is to perform research that will create the electricity superhighway of the future by dramatically improving the way electricity is generated, delivered and used.

Energy Storage Systems -The Energy Storage Systems (ESS) Program will work in the new electricity marketplace with its increased emphasis on distributed resources and energy services to develop state-of-the-art energy storage technologies.

The mission is to perform research that provides energy storage systems that create increased value for renewable power systems, and enhance power quality, reliability, productivity and efficiency for electricity users and providers in a competitive electricity infrastructure.

Program Goals and Objectives

Transmission Reliability - The goal of the Transmission Reliability Program is to insure an efficient, reliable power delivery system in the U.S. during the electricity industry transition to competitive markets, through development of advanced technologies that allow lowest-cost, efficient power delivery systems, and integration of distributed resources.

The objectives of the program are to insure the reliability and security of the Nation's electric power system, increase utilization of renewable energy sources, enable customer choice in power quality and self-generation options, provide the capability for information flow needed for the efficient operation of competitive markets, enable significant reduction of air emissions, and enable distributed utility options that integrate natural gas and electric power delivery benefits.

The Program will contribute to the goals and objectives of the Comprehensive National Energy Strategy by supporting competitive and efficient electric systems; ensuring energy system reliability, flexibility, and emergency response capability; accelerating the development and market adoption of environmentally friendly technologies; and developing technologies that expand long term energy options.

The program is projected to be five-years in duration and will ensure that research and development for reliable system and competitive markets is maintained until new market and/or regulatory structures are developed that provide the incentives for the private sector to assume this work. To insure that competitive markets are driving technology choices, any hardware development would be at least 50%

cost-shared by the private sector, and Federal support for hardware demonstration would be limited to test and evaluation activities. The Program also provides a Federal electric power system technical capability to support government policy decision-making during this transition. The Program will be reassessed each year to determine the need for Federal involvement depending on the nature and implementation needs of new regulations, and the impact of market forces.

High Temperature Superconducting R&D - The DOE program is accomplishing two major technological goals: solving the difficult problem of manufacturing electrical wires from the family of brittle ceramic superconducting materials, while in parallel, creating designs of super efficient electrical systems such as motors, transmission cables, generators, transformers and current limiters that use these wires. The products will be resistance-free electrical wires that carry 100 times the current of conventional alternatives and the design of advanced systems that have only half the energy losses and are half the size of conventional alternatives of the same power rating.

Superconductivity will bring a more fundamental change to electric power technology than has occurred since electricity use became widespread over a century ago. The potential is for an energy revolution as profound as the impact fiber optics has had on communication. The fiber optic "information superhighway" was constructed by replacing copper wires with a higher capacity alternative. Superconducting provides an "energy superhighway" that greatly improves efficiency and capacity. The economic (several billion dollars per year market by 2020) and energy impacts (offset potential of 40 medium size conventional generation plants in the U.S. alone) are predicted to be huge.

Perhaps the most important aspect of superconductivity is the contribution it can make in deregulating the electric utility industry. Superconducting transmission lines can provide efficient paths for power to flow from generation sites to load centers with minimal visual or environmental impacts. Superconductivity can also provide many cost and reliability advantages such as increased generator stability, system power control and protection from damaging "fault currents" caused by lightening strikes and other accidents.

The High Temperature Superconducting R&D (HTS) program fits uniquely into Goal I of the Comprehensive National Energy Strategy by increasing the efficiency and economic performance of the national energy system while helping to protect the environment and enhance national security. The superconductor in an HTS transformer reduces electricity energy losses to approximately one-eighth of the level of conventional transformers. The electric losses in HTS cables are approximately half those of conventional overhead transmission lines. Note that the electric energy losses on the United States electric grid due to inefficiencies are greater than all the electricity consumed in the continent of Africa. Consequently, High Temperature Superconductivity devices will make a significant contribution toward increasing the efficiency and economic performance of the U.S. electric system.

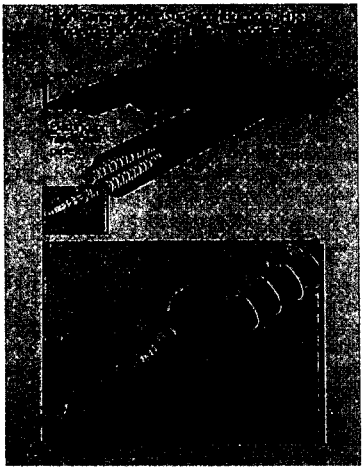
Introduction of HTS technology will affect the environment in two important ways. First, pollution will be reduced. If the entire electric grid and large electric motors were converted to superconductors, CO_2, SOx, and NOx would be reduced by 17,000 thousand metric tons, 300 thousand metric tons and 120 thousand metric tons respectively. The savings in CO_2 are approximately 1% of the total carbon

emissions in the U.S. in 1996. The second area where superconductivity will help improve the environment is by putting unsightly overhead transmission lines underground and reducing the area necessary for power delivery corridors. Finally, superconducting will increase the security of the U.S. electric grid by reducing the exposure of these facilities to acts of vandalism and terrorism.

"Power Line Makes Use of a Miracle of Physics

After 87 years of alternating exuberance and disappointments, and a decade after a famous conclave of physicists at which the key to success seemed to be within reach, the world's first superconducting power line is about to become a reality."

NY Times - November 3, 1998 describing the DOE project to provide electricity to downtown Detroit using a superconducting cable.



Underground HTS cables can carry three to five times more current than conventional copper cables.

Energy Storage Systems -The Energy Storage Systems program is working to create energy storage technologies with a cost goal of $700 per/kW and an energy density goal of 5 kWh per square foot by the year 2003.

The Energy Storage Systems program will develop integrated, cost-effective energy storage systems for the three thrust areas of renewables, reliability (including power quality), and productivity. These systems will offer multiple benefits for electricity providers over a wide array of applications, ranting from small scale remote installations to major industrial facilities. Among these benefits are reduced cost to the U.S. economy of power quality and reliability problems; enhanced utility and customer choices in responding to electric industry restructuring; and increased economic value of renewables and distributed resources.

The ESS Program will work with renewable programs and industry partners to develop integrated systems that increase the value of electricity derived from intermittent wind and solar sources by making the power available regardless of when it is generated. Projects will be initiated that will improve the performance of energy storage technologies in hybrid systems. Recent research has projected a world market for photovoltaic hybrids of $4,000,000,000 by the year 2000.

Energy storage systems will improve the reliability and security of the Nation's electricity transmission and distribution system, helping to meet the objectives of ensuring energy system reliability, flexibility, and emergency response capability as outlined in the Comprehensive National Energy Strategy. Transmission and distribution system productivity and efficiency will be enhanced by storage systems that correct the brief power outages and distortions estimated to cost U.S. industry over $100,000,000,000 a year.

Energy storage systems can also provide significant productivity gains for large electricity users and providers, increasing the competitiveness of U.S. industry. The ESS Program will develop systems for distributed siting that offer multiple benefits for the user including avoidance of peak demand charges, reduced equipment failures, from power-quality problems.

Federal involvement through the ESS Program is critical to the long-range development of conventional and emerging storage technologies. These storage technologies are key to increasing the value of DOE's renewable energy programs for both grid-connected and remotely-sited systems. Energy storage systems integrated with distributed resources into the electric distribution systems, provide the customers with energy control options for maintaining system reliability.

Strategic Approach

Transmission Reliability - The Transmission Reliability Program will be implemented through a National laboratory/electric industry partnership to conduct research on the reliability of the Nation's electricity infrastructure. This strategic partnering approach will insure that research and development (R&D) is defined and initiated that meets electric industry needs, and can be transition for further development or deployment by the industry. The Program will collaborate with industrial and academic partners to develop technologies that promote competitive markets, ensure system reliability (adequacy and security), increase network capacity for large scale, long distance power transfers, and promote integration of distributed resources, including renewable generation and storage. The Program will also examine how market stimuli, and Federal and State regulation combined with the development and application of advanced technologies can be structured to assure incentives for private funding for reliability R&D, and additions of new technologies during and after the transition to competition.

The Transmission Reliability Program focuses on applying advanced computing, sensing, power electronics, communications, and control technologies to provide real time system control for reliable, efficient operation of the Nation's electric power system under both normal and emergency operating conditions. These fundamental technologies will be developed into advanced systems applications under the Power Systems Reliability and Distributed Power activities.

Power Systems Reliability will develop control and information systems to monitor and control the power system in real time, and advanced power electronics to accomplis fast, high-power switching under real time system control. Real time system control will apply next generation hardware, and develop advanced power system algorithms which will allow operators to measure the status of the system in real time, thereby allowing maximum integration of advanced technologies into the power system to ensure system reliability, save capital costs by more fully utilizing existing utility assets, and enable competitive markets. Advanced power electronics will adapt existing high-efficiency, low-cost power converter designs for both transmission and distribution system control equipment. This activity will also develop advanced switching devices materials such as silicon carbide, which result in significantly higher capacity, lower cost, and lower loss power conversion equipment than today's power converters provide.

Distributed Power supports development of technologies, and removal of barriers to enable the integration of distributed generation and storage into the electric and natural gas systems. Distributed technologies include renewable resources, fuel cells, microturbines, battery and flywheel storage, and

direct load control. Integration of these technologies offers environmental and economic benefits, and extends competition to the retail customer level. To enable successful integration of distributed resources into the distribution system, the program will address technical, regulatory, and institutional issues. The program will develop technology solutions to allow safe and reliable distributed power system operation that provides both local and transmission-level benefits. In addition, the Federal government will address technical and regulatory barriers that are common to local electricity distributors, and facilitate work with State and local governments to address other institutional barriers.

Distributed power supports strategic research, systems integration, and institutional issue activities. Strategic Research activity will develop advanced system operational concepts for the integration of small, modular generation and storage technologies into the distribution system. System integration issues, including safety, reliability, power quality, interconnection, and environmental issues related to distributed generation and storage, will be identified through modeling and other engineering analyses, case studies and hardware system integration testing and demonstration. The Institutional Issues activity will identify and assess the impacts of current practices, planning methodologies, power systems engineering training, policies, regulations, ownership structures, and other institutional issues on distributed power applications.

High Temperature Superconducting R&D - To accomplish its mission, the High Temperature Superconducting (HTS) program has mobilized the resources of U.S. industry, national laboratories and universities in a high-risk, parallel development approach: research on the underlying technology, superconducting wires, is being done at the same time applications systems are being designed. This approach will effectively reduce the time to introduction of full-scale systems by a decade or more. A strategic alignment is followed in the program structure, with two industry-led initiative elements and a government lead research element.

The very successful Superconductivity Partnership Initiative (SPI) element supports aggressive industry-lead projects to design advanced electrical applications. SPI projects include generators, transformers, motors, transmission cables, current controllers, flywheel energy systems and magnetic separation systems. A unique SPI feature is that each project involves vertically integrated teams (typically including an electric utility, a system manufacturer and a superconducting wire supplier as well as one or more national laboratories). This vertical integration has proven a powerful way to include customer focus and leverage resources.

The industry-led Second Generation Wire Initiative is exploiting breakthroughs at Los Alamos and Oak Ridge National laboratories that promise unprecedented current-carrying capacity in high-temperature superconducting wires. These breakthroughs, which made headlines worldwide, will allow long wire lengths to behave as a single crystal, thus eliminating internal barriers to current flow that may limit the use of wires now being manufactured. Several industry teams are now working with the national laboratories to scale up the new discoveries.

The Strategic Research program element provides the underlying knowledge base needed for the success of the above industry-led projects. The Second Generation Wire Initiative evolved from five years of strategic research that achieved world record performance breakthroughs in short wire samples. Strategic Research will continue on wire processing as well as exploratory research on innovative systems. In addition, research and analysis will be conducted on issues associated with integration of superconducting systems into an increasingly competitive and restructured industry framework.

Energy Storage Systems - The ESS program works with a diverse group of partners to met end user needs. The Program cooperates extensively with electricity users and providers, equipment manufacturers, system integrators, academic and research organizations. This cooperation helps identify merging trends, and supports development of energy storage systems that will play a vital role in a restructured electricity marketplace. Collaboration with industry partners also allows the ESS Program to leverage resources through cost-shared agreements. In FY 1998, the Program received over $1,600,000 in cos-sharing commitments from its industry partners.

The following projects supported by the Program and its partners will contribute to an increase in new storage technology, and save U.S. consumers billions of dollars in energy-related costs: 1) development and testing of factory-integrated PV/storage systems as part of the Renewable Generation and Storage (RGS) project. The RGS project is a major component of the Storage 2000 Initiative, a joint DOE/industry initiative to accelerate technology development for emerging needs in a restructured electricity marketplace; 2) design of a storage-based power quality system to enhance the reliability and security of the Nation's electricity transmission and distribution system in the restructured electricity marketplace; 3) completion of the Mobile PQ 2000 project with the demonstration of a transportable power quality system by an ESS partner; 4) testing of the Advanced Battery Energy Storage System (ABESS), a transportable, modular zinc/bromine battery system that will increase productivity and efficiency for end users; and 5) development of critical storage components such as power conversion systems and controls in a cost-shared program with industry.

Program Benefits

Transmission Reliability

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.02	0.12	0.13
Energy Cost Savings ($ Billions)	0.00	0.00	0.00
Carbon Displaced (MMTCE)	0.50	2.00	3.00

Using real time control and information systems along with fast, power electronic switching, power systems will quickly evolve that require less conventional power transmission equipment and less reserve generation capacity, while maintaining overall reliability. These systems will allow energy savings and air emissions reductions from less run-time of standby fossil-fired generation, and capital savings through greater utilization of existing system facilities. The Program also performs a vital Federal role by enabling system benefits and competitive wholesale and retail markets through maximum integration of other DOE-developed technologies such as renewable energy resources, energy storage, superconducting equipment, and fuel cells.

High Temperature Superconducting R&D

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.00	0.01
Energy Cost Savings ($ Billions)	0.00	0.24	1.03
Carbon Displaced (MMTCE)	0.00	0.00	0.14
Direct Electricity Displaced (Billion kWh)	0.00	3.30	14.2
Direct Coal Displaced (Million Short Tons)	0.00	0.72	2.80

Other major benefits are expected in electricity grid capacity and reliability as superconducting technologies are introduced. These benefits may be necessary to meet expected new patterns (and large increases) of electricity flow from producers to consumers as markets are deregulated.

Conservative estimates of gradual technology penetration show that within 20 years over 300,000 households could be supplied by the gains in efficiency due to superconductivity. Efficiency gains possible with an all HTS system represent the electrical needs of 8,000,000 households.

Energy Storage Systems

Metric	FY 2000	FY 2010	FY 2020
Primary Energy Displaced (Quads)	0.00	0.00	0.00
Energy Cost Savings ($ Billions)	0.00	0.00	0.00
Carbon Displaced (MMTCE)	0.01	0.02	0.03

These benefits correspond to powering approximately 1,000 homes in the year FY 2000 with renewable generation and storage systems. Energy displaced and carbon reduction result from enhanced integration of renewable energy resources into the electricity market, and peak load reduction. Improved productivity and electric power reliability resulting from improved power quality account for the non-energy cost savings.

Performance Measures

FY 2000 Performance Measures

Transmission Reliability

- Develop plan for distributed power technologies demonstration test bed.
- Complete draft of uniform interconnection standard for distributed resource technologies.
- Complete action plan for addressing institutional and regulatory barriers for distributed power.

High Temperature Superconducting R&D

- The second generation wire being produced in the program must exceed 100 meters in length and 500 amperes per square millimeter in current density are expected.

- The first-of-a-kind superconducting cable to be installed in downtown Detroit must be flexible enough to be installed under city streets without damage and be able to carry the electrical load efficiently and reliably.
- The superconducting power transformer must carry its rated load efficiently and reliably.

Energy Storage Systems

- Increase the energy available in battery storage systems to 3.0kWh/square foot.

FY 2001 - 2006 Performance Measures

Transmission Reliability

- Develop computer software to simulate real time control algorithms for real time systems control, including reactive power and voltage control.
- Test intelligent distributed control agent to provide control and information for distributed power management.
- Complete Phase I of distributed power system integration tests.
- Test high voltage power electronic converter for power transmission application.
- Test device-grade, high band-gap switching material for power converter at intermediate voltages.

High Temperature Superconducting R&D

- Develop the capability to manufacturer kilometer lengths of high capacity wire (current-carrying ability of 1,000 amperes per square millimeter cross-section) at a potential cost of $0.01/ampere-meter.
- The first-of-a-kind systems installed during this period must show significant improvements over conventional systems in terms of efficiency, capacity and reliability.

Energy Storage Systems

- Reduce the cost of energy storage systems to $700/kW.
- Increase the energy available in energy storage systems to 5.0kWh/square foot.

Significant Accomplishments and Program Shifts

Pre-FY 1998 Accomplishments

Transmission Reliability

- No program established.

High Temperature Superconducting R&D

- Program participants have set most of the world's technological milestones in the last several years, including those for motors (200 horsepower motor tested), cables (50 meter, 3,000 ampere cable began testing), and transformers (1 MVA unit tested). Four R&D 100 awards were won, as well as

the DOE award for Solid State Physics and the Lockheed Martin Corporation's NOVA award for teamwork.

Energy Storage Systems

- In FY 1997, a 1.4 MWh energy storage system was installed on the Annette Island Reserve in southeast Alaska, home to the 1,700-member Metlakatla Indian tribe. The system, built with technical assistance from the ESS Program and charged by hydropower, eliminates continual use of a 3.3 MW diesel engine. In the first eight months of operation, fuel use was reduced by 180,000 gallons, resulting in a cost savings of over $39,000 a month.
- A 3.5 MWh battery energy storage system was installed at a lead battery recycling plant in Vernon, CA. The system supports critical plant loads during power outages to prevent violations of lead emissions standards and has greatly reduced the plant's costly non-compliance fines. The system has provided peak shaving and uninterrupted power since 1996.
- The PQ 2000 energy storage system was installed at an industry site in Homerville, GA. The 1 MW, 10-second, factory-assembled system corrected over 90% of the plant's power quality disruptions during the first six months of operation. In 1997, DOE, AC Battery and other industry partners, received the prestigious R&D 100 award for the PQ 2000 energy storage system.

FY 1998 Accomplishments

Transmission Reliability

- No program established.

High Temperature Superconducting R&D

- Six teams were selected for funding in the Superconductivity Partnership Initiative (SPI) in a free and open competition. The winners proposed to develop near and long term designs for power cables and transformers, a flywheel power system using superconducting bearings, and a magnetic separation system.
- The SPI 3,000 amp transmission cable was completed, and initial scale-up requirements were met for wire processing breakthroughs by the national laboratories.

Energy Storage Systems

- Completed three studies that define the present and future needs of users of RGS systems, and determine the application requirements of the RGS systems that would meet these needs.
- Field tests of the Mobile PQ 2000 power quality storage system were initiated at a utility site.
- Completed assembly and testing of a small-scale test module zinc/bromine battery with four times the energy density of today's lead acid batteries.

Electric and Magnetic Fields

- Completed planned health effects research and exposure assessments leading to a risk assessment by the National Institute of environmental Health Sciences in 1998.

- Conducted and disseminated a risk evaluation by an international panel of experts concerning health effects from exposure to electric and magnetic fields, and document research results.

FY 1999 Planned Accomplishments

Transmission Reliability

- Completed workshops and six studies to identify and define needs for reliability research in a restructured U.S. electricity industry.

High Temperature Superconducting R&D

- The world's first high-field (1.0 Tesla) superconducting magnet will be built that operates a liquid nitrogen temperatures; a facility designed to manufacture continuous lengths of second generation superconducting wire will be built; and the world's largest HTS motor (1,000 horsepower) will be tested at an industrial site.

Energy Storage Systems

- Develop a test bench-scale hybrid storage/generation hardware and control configurations to assess the optimum use of storage in RGS systems under the Storage 2000 Initiative.
- Develop critical storage components such as power conversion systems and controls in a cost-shared program with industry.

Climate Challenge

- Maintain existing partnership agreements to ensure year 2000 pledge reductions of at least 47 million metric tons of carbon equivalent.
- Expand voluntary industry/government collaboration to reduce greenhouse gases by catalyzing a Climate Change forum with over 600 utility partners to exchange lessons-learned on cost-effectively reducing greenhouse gases.

FY 2000 Planned Accomplishments

Transmission Reliability

- Complete multi-year demonstration plan for distributed technologies test bed.
- Complete draft of uniform interconnection standard for distributed generation and storage technologies.
- Identify regulatory and institutional barriers to distributed power, and develop and begin implementation of an action plan to address these.
- Complete models to simulate ancillary services market designs.

High Temperature Superconducting R&D

- A 3-phase superconducting cable will be the world's first to supply power to a manufacturing complex. The cable will be 30.5 meters long, and will carry 1,250 amperes of current at 12,500 volts. The equivalent power would serve a city of 25,000 people. Construction of a research facility for continuous manufacturing of second generation wire will begin.

- An advanced, and environmentally friendly, 10 mega volt amperes power transformer will be the first to provide electrical service to a manufacturing facility. Half the size and more efficient than conventional alternatives, this superconducting transformer also eliminates oil cooling that can cause fire and pollution problems.
- Technology of "second generation" HTS wires will have advanced to 100 meter lengths being manufactured able to transmit 100 amperes through a one millimeter wire cross-section (over 100 times the capacity of conventional wires).

Energy Storage Systems

- Initiate a substation power quality system project with an industry partner; the system will improve the reliability of the Nation's electricity infrastructure.
- Begin the testing phase of Advanced Battery Energy Storage System (ABESS) project; this technology will increase productivity and efficiency for large end users.
- Complete a cost-shared demonstration of a customer-sited storage system with a major utility; this system will provide cost-savings, load management, and controllable reserve margins for energy providers of the future.
- Complete the Transportable Battery energy Storage System (TBESS) project; an ESS partner will then undertake commercialization of the mobile power quality system.

FY 2001 - 2004 Planned Accomplishments

Transmission Reliability

- Complete evaluation of the correlation between satellite-synchronized system measurements and model predictions of known power system events.
- Deliver software to implement real-time data system for reactive power analysis of large systems.
- Complete assessment of intelligent distributed control agents.
- Complete design of distributed power system integration tests to identify safety, power quality, interconnection, and environmental issues related to distributed generation and storage.
- Initiate large scale simulator tests of real time system control aimed at reducing air emissions and increasing system reliability.
- Complete laboratory development of techniques for production of high purity silicon carbide for advanced power electronic switches.
- Complete Phase I distributed power system integration tests.
- Begin tests of advanced high efficiency, high voltage power electronic converters for power transmission applications.

High Temperature Superconducting R&D

- A number of world-class accomplishments will be achieved. A 5,000 horsepower motor will be run under actual operating conditions to complete the SPI motor project; power will be supplied to businesses in a downtown metropolitan area to complete a SPI cable project; an advanced design 10

MW power transformer will be operated at an electric utility substation; and continuous lengths of high performance second generation wire will become available for incorporation into SPI equipment designs.

Energy Storage Systems

- Complete development and testing of several integrated PV/storage systems as part of the RGS project.
- Test the substation power quality system with industry partners.
- Develop improved advanced storage (e.g., flywheels or SMES) components with industry partners designed for power quality and reliability systems.
- Complete the ABESS project; industry will begin commercialization.

Program Completion

Transmission Reliability

This is projected to be a five-year program to ensure that research and development for reliable systems and competitive markets is maintained until new market and/or regulatory structures are developed that provide the incentives for the private sector to assume this work. Continued involvement with electricity industry participants will ensure that his R&D supports technologies that will integrate into, and be adopted under future operational/market scenarios. The program will be reassessed each year to determine the need for Federal involvement depending on the nature and implementation needs of new regulations, and the impact of market forces under both Federal and State regulations.

High Temperature Superconducting R&D

The program supports basic research on wire materials processing and design of first-of-a-kind systems in order that HTS power applications are brought to widespread use in the shortest possible time.

Basic research activities will be completed during FY 2004 - FY 2006 resulting in practical wires from U.S. manufacturers that can achieve 1,000 amperes per square millimeter of cross-sectional area while operating at liquid nitrogen temperatures in a field of 3 Tesla. "Practical wires" imply flexibility, ruggedness, and affordability when produced in sufficient quantity.

Energy Storage Systems

The Energy Storage Program research and development is focused on enhancing the performance and reliability while reducing the cost of energy storage systems for the competitive electric power marketplace. These energy storage technologies include battery, flywheel, superconducting magnetic energy storage (SMES) and high energy density capacitor systems.

Basic development activities will be completed during FY 2004-FY 2006 with the completion of performance evaluations of systems that meet the cost and energy density goals for the Program.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Transmission Reliability	0	3,000	4,000	+1,000	+33%
High Temperature Superconducting R&D	31,579	32,500	31,000	-1,500	-4.6%
Energy Storage Systems	3,839	4,500	6,000	+1,500	+33%
Climate Challenge	0	100	0	-100	0.0%
Electric and Magnetic Fields R&D	7,844	0	0	0	0.0%
Total, Electric Energy Systems and Storage	43,262	40,100	41,000	+1,900	+4.7%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Transmission Reliability

- **Power System Reliability** - Develop real-time measurement and control systems to collect and apply power system data in real time to ensure and enhance electric power system security and reliability, reduce air emissions, and enable efficient markets. Investigate incremental modifications to grid system models to take advantage of real time data. Evaluate data requirements and develop models for ancillary services markets. The funding level is considered appropriate as a ramp-up level from the FY 1999 program start, with the projected placement of additional industry cost-shared contracts under the National laboratory/electric industry partnership to support transmission reliability of the electric infrastructure. The program was formulated after electric industry views on the direction, content and priorities of the program were solicited at a workshop with broad industry representation, and through discussions with EPRI at the yearly DOE/EPRI Sustainable Electric Partnership Executive Conference.

  Develop performance and cost models for advanced multi-level inverters for power system applications, and identify applications for simulation tests. Assess state of the development of high band-gap materials for high capacity power electronic switching devices, and initiate silicon carbide

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
material development. These technologies allow the grid to be operated in real time to enable competitive markets, and maximize use of existing rights of way.	0	2,500	3,800
■ **Distributed Power (DP)** - Initiate multi-year cooperative efforts with industry and state energy agencies to develop innovative concepts for electric power system design utilizing distributed generation and storage resources. Identify applications and market mechanisms to realize benefits of distributed power and quantify potential benefits.			
Initiate activities, including modeling and case studies, for system integration tests of distributed generation and storage to examine safety, reliability, power quality, interconnect, environmental and other issues related to distributed generation and storage, and interactions of gas and electric distribution systems. With industry, draft interconnect standard for distributed generation and storage. Identify institutional barriers to the deployment and utilization of distributed resources, and develop and implement strategies for minimizing the effect of these barriers. The DP program was formulated after electric industry views on the content and priorities of the program were solicited at a workshop with broad industry representation. The level and distribution of funding in DP is appropriate to initiate the Program based on the status of research in these areas determined from industry.	0	500	200
Total, Transmission Reliability	0	3,000	4,000

High Temperature Superconducting R&D

■ **Superconductivity Partnership Initiative** - Activities will support six major projects to develop first-of-a-kind electrical systems that can provide quantum improvements to the efficiency and capacity of the national grid. These include transmission cables, transformers, large motors, flywheel energy systems and magnetic separation systems that meet performance goals. The programs's past experience has demonstrated that this extremely ambitious schedule is possible within the funding requested because of careful planning and leveraging of resources. Leveraging includes the 50% cost share that the program has been able to

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
attract, even though the projects are very high risk. Additional leveraging occurs because the project teams are typically a vertically integrated consortium of companies containing a future product use (an electric power company), a manufacturer, and a superconducting component supplier.	14,000	14,500	14,000
■ The Second Generation Wire Initiative is crucial to producing superconducting wire that meets the program's performance goals. High-performance, low-cost wire is the key to the success of the Superconductivity Partnership Initiative projects. Four industrial consortia will be working with the national laboratories to scale up discoveries that are the basis for this initiative. Wire performance goals of length, current density and cost will be met. The performance goals are very ambitious but past success indicates that the prospects are good for meeting them at the requested funding level. Private sector participants' 50% cost-sharing leverages program funds. The program has drawn upon some of the finest expertise available and feels that the requested funding will provide the resources necessary to meet program goals.	8,000	8,000	8,000
■ The Strategic Research program component has been the incubator for discoveries and innovations now being pursued in the two above initiatives. The entire program depends on continued results from in-house national laboratory research and joint research being carried out with private companies under 50% cost-shared agreements. This activity provides fundamental knowledge needed in the above two initiatives. The requested level of funding has been sufficient to provide the critical masses of multi-disciplinary research teams that have contributed breakthroughs in the past. Important research leveraging is obtained through complementary work funded by the DOE Office of Basic Energy Science, program funded work at several universities and leveraged research at the National Institute of Science and Technology (two NIST dollars for every program dollar).	9,579	10,000	9,000
Total, High Temperature Superconductivity.	31,579	32,500	31,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Energy Storage Systems			
■ **Storage Systems Integration** - Demonstrate advanced integrated systems based on end user needs in the areas of reliability, power quality and renewables. Initiate one to two new Renewable Generation and Storage (RGS) projects that will produce improved integrated PV/storage hybrid systems, enabling the increased utilization of renewable generation at a lower cost and with reduced maintenance requirements. Continue and complete multi-year project to develop and test the Mobile PQ 2000, a state-of-the-art, transportable system that provides premium power services to commercial and industrial customers. Begin testing phase of ongoing Advanced Battery Energy Storage System (ABESS) project. This Technology will increase productivity and efficiency for large electricity users by allowing them to manage the costs of energy usage using low-cost, small size batteries. Initiate development of a new energy storage system under the Storage 2000 initiative to improve transmission and distribution stability. This new system will improve the reliability of the nation's electricity infrastructure in a competitive marketplace, and improve power quality. The funding level and program elements for systems integration were established through a series of meetings with the photovoltaic and battery industries, and a separate series of executive conferences with the electric service provider industry.	1,950	2,200	3,000
■ **Key Components for Storage Systems** - Begin testing prototype power controller software that provides improved switching and optimal control strategies for hybrid (e.g. PV/diesel/storage) systems. This technology will maximize performance and reduce cost by decreasing maintenance and extending component lifetimes. Begin development of remote power systems testing requirements for international project with industrial R&D funding body. This project will greatly			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
improve the reliability of modular renewable energy systems not connected to utility grids. The funding level and identification of key components for development were established through stakeholder and industry reviews, and evaluation of the performance of existing systems. The funding level is appropriate based on industry assessments and program experience in these technologies.	1,350	1,400	2,100
■ **Analysis and Utility Competition** - Use models and engineering assessment tools to produce unbiased system studies, opportunities analyses, and technology assessments of potential high-value energy storage applications. Begin the first phase of a Handbook on Energy Storage for Renewable Systems that provides technical guidelines to members of the renewables and storage communities for improved integration of energy storage with renewables. Complete quantitative analysis of the impact of energy storage on reliability for energy providers in a restructured electricity marketplace. The funding level is appropriate based on extensive program experience in analyzing similar opportunities and benefits for application of storage technologies to enhance power quality for utility and industrial application.	539	900	900
Total, Energy Storage Systems.	3,839	4,500	6,000
Climate Challenge			
■ Engage in dialogue with electric utility industry to design a voluntary program for the post-2000 period. Then renegotiate individual agreements with utilities to include voluntary utility commitments in the post-2000 period. Continue to compile and report utility industry pollution reduction accomplishments.	0	100	0
Electric and Magnetic Fields R&D			
■ Completed experiments to identify the biophysical basis for replicable EMF biological effects and relevant EMF exposure parameters. Completed intensive research begun in FY 1996			

	(dollars in thousands) FY 1998	FY 1999	FY 2000
to replicate key findings, using advanced EMF exposure systems at four Government laboratories. Completed a risk evaluation of potential human health effects from exposure to electric and magnetic fields (by NIEHS). Continued intensive communication program, including publication and distribution of booklets updated with most recent information. Carryover balances will be used to complete a few unfinished studies in FY 1999.			
■ In FY 1998, $1,000,000 was provided for aluminum matrix composite (AMC) conductors: Conduct utility case studies on the value of AMC conductors for increasing the capacity of transmission lines; investigate alternative materials and compositions; and investigate more efficient and economical manufacturing processes as directed by Congress.	7,844	0	0
Total, Electric Energy Systems and Storage.	43,262	40,100	41,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 (000)
Transmission Reliability Program	
■ Increased funding will initiate development of real time measurement systems to provide information for reliable system operation and competitive markets, and initiate Distributed Power Program.	+1,000
High Temperature Superconductivity	
■ The $500,000 decrease is due to a decreased number of CRADAs in the strategic research element.	-1,500
Energy Storage Systems	
■ Initiate project to develop integrated PV/hybrid storage systems; begin testing phase of the Advanced Battery Energy Storage System (ABESS) project; begin testing prototype power electronic controllers for optimum switching and control strategies.	+1,500

	FY 2000 vs. FY 1999 (000)
Climate Challenge	
■ Reduction is based on current program needs.	-100
Electric and Magnetic Field R&D	
■ EMF program completed.	0
Total Funding Change, Electric Energy Systems and Storage.	+1,900

Solar and Renewable Program Direction

Mission Supporting Goals and Objectives

Program Direction provides the Federal staffing resources and associated funding to support the management and oversight of the Solar and Renewable Energy Programs. This activity includes all funding for support service contractors, equipment, travel, crosscutting activities, and Assistant Secretary initiatives. This permits the continuation of a diverse array of Solar and Renewable projects to be integrated into a national portfolio of world renown research. Program Direction encompasses two principal activities: (1) Headquarters executive and program management; and (2) program operations at the Golden Field Office and the Idaho Operations Office.

Secretary Richardson announced in November that based on a review of the Department's staffing, the reductions had far exceeded the final FY 2000 Strategic Alignment Initiative (SAI) goals, and in fact the aggressive downsizing was now having a negative impact on technical and professional positions. As a part of the Workforce 21 initiative the Office of Energy efficiency and Renewable Energy completed a comprehensive workforce analysis for the Fiscal years 1999 and 2000, including and in-depth review of requirements for each of the component EE organizations. A total of 51% of the 155 positions that EE lost to downsizing since 1995 were technical and professional personnel, this has impaired EE's ability to deliver on its mission requirements. Further, the downsizing eliminated many lower and mid-level technical and professional employees and this is now straining EE's ability to develop successors to our retiring employees. Based on current business-as-usual staffing projections, by January 1999, 48 more technical and professional staff will be eligible for retirement, and by FY 2003 as many as 131 technical and professional employees will be eligible for retirement.

The FY 2000 Congressional Budget Request lays the foundation to off-set the adverse impacts of the downsizing. Additionally, EE has adopted smarter, more effective business and management practices, and as revealed in the workforce analysis these efforts have greatly reduced the need for most but not all of the staff lost due to downsizing. The requirements for Solar and Renewable programs could be accomplished with additional staffing above the current FY 1999 staffing levels. These new positions are consistent with EE's Workforce 21 strategy, which is to concentrate the majority of the critical hires to the technical and professional category, leaving the clerical/administrative and manager/supervisor staffing levels virtually the same.

Performance Measures

- Responsiveness to national energy policy goals and objectives.
- Continued improvement in the utilization of Federal staffing, travel, and support service contractor funding.
- Continued reductions in fiscal year-end uncosted obligations.
- Continued increase in competitive contract awards.
- Cost sharing and leveraging of program resources to enhance the program's impact.

- Improvement in environment, safety, and health compliance.
- Ensuring that all Federal employee costs, travel, support service contracts, ASEE initiatives, and crosscutting activities are supported from within Program Direction.
- Committed to creating and maintaining an environment that is free from discrimination.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Golden					
Salaries and Benefits	1,399	1,225	1,885	+660	+53.9%
Travel	64	55	80	+25	+45.5%
Support Services	0	370	430	+60	+16.2%
Other Related Expenses	46	50	250	+200	+400.0%
Total, Golden	1,509	1,700	2,645	+945	+55.6%
Full Time Equivalents	18	15	15	0	0.0%
Idaho					
Salaries and Benefits	88	90	95	+5	+5.6%
Travel	0	0	0	0	0%
Support Services	0	0	0	0	0%
Other Related Expenses	0	0	0	0	0%
Total, Idaho	88	90	95	+5	+5.6%
Full Time Equivalents	1	1	1	0	0.0%
Headquarters					
Salaries and Benefits	8,972	8,750	9,690	+940	+10.7%
Travel	340	350	360	+10	+2.9%
Support Services	3,161	5,520	4,691	-829	-15.0%
Other Related Expenses	1,581	1,690	1,690	0	0.0%
Total, Headquarters	14,054	16,310	16,431	+121	+0.7%
Full Time Equivalents	98	91	84	-7	-7.8%
Total Solar and Renewable Resources Technologies					
Salaries and Benefits	10,459	10,065	11,670	+1,605	+15.9%
Travel	404	405	440	+35	+8.6%
Support Services	3,161	5,890	5,121	-769	-13.1%
Other Related Expenses	1,627	1,740	1,940	+200	+11.5%
Total, Program Direction	15,651	18,100	19,171	+1,071	+5.9%
Total Full Time Equivalents	117	107	100	-7	-6.5%

Detailed Program Justification

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
Salaries and Benefits			
■ Staff funded in this decision unit provide the executive management, program oversight, analysis, and information required for the effective implementation of the Solar and Renewable Resources Technologies Programs. The staff are also responsible for the development of policies, strategic plans and related guidance to program offices; the evaluation of program performance; the formulation, defense and execution of the Solar and Renewable budgets; and communications with the public and stakeholders regarding policies, budgets, program performance and related issues. Additionally, Solar Program Direction supports staff at the Golden Field Office and the Idaho Operations Office. Based on the completion of a comprehensive Workforce 21 analysis, additional critical professional/technical FTEs have been identified to ensure that EE's ability to deliver on its mission requirements is not impaired. EE is committed to reduce the costs for all administrative activities and achieve savings through a more streamlined and efficient management of federal staffing levels in this account. The requested FTEs are consistent with EE's Workforce 21 strategy, which is to concentrate the majority of the critical hires to the technical and professional category, leaving the clerical/administrative and manager/supervisor staffing levels virtually the same. The FY 2000 Congressional Request for Program Direction provides for staffing adjustments resulting from Workforce 21.	10,459	10,065	11,670
Travel			
■ Travel has been substantially reduced from previous years through the use of teleconferencing facilities for the conduct of oversight activities of some field organizations. The escalation of travel costs preclude further reductions without impacting EE's ability to achieve its missions requirements.	404	405	440

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000

Support Services

- Includes all funding for support service contractors, equipment, crosscutting activities, and Assistant Secretary initiatives. Such activities include the development and evaluation of performance measurement and quality metrics for the Solar and Renewable Energy Programs. These activities are expected to achieve efficiency savings throughout the programs, and return to the taxpayer program cost savings far in excess of the expenditure. The support, will enable adoption of sound business practices called forth under the Government Performance and Results Act (GPRA) of 1993 and the Government Management Reform (GMRA) Act of 1994. Other support services include activities such as mailroom and travel processing.

  In FY 1999, a total of $1,900,000 is included for electricity restructuring activities including $1,500,000 in the original appropriation and $400,000 in the Omnibus Consolidated Appropriation Act. The Department is currently working on a program plan to Congress describing this new program including the discrete role the Department would play that is not duplicative of services provided by the private sector, state governments, or other Federal agencies. Also, within the $1,500,000 for restructuring, funds are provided for financial and technical assistance to states undergoing restructuring, including $150,000 for electricity restructuring activities of the California Energy Commission. In FY 2000, the electricity restructuring activities are included in the Congressional Request under Solar Program Support. 3,161 5,890 5,121

Other Related Expenses

- This activity includes the Working Capital Fund (WCF) and contractual services associated with landlord support of the Golden Field Office. Funding for the WCF in FY 1998 through FY 2000 is $1,581,000; $1,690,000, and $1,690,000 respectively. Rent is the largest component of the Working Capital Fund (FY 1998 through FY 2000 is $985,000; $926,000, and $890,000 respectively). The balance of the Other Related Expenses is for Golden landlord requirements

	(dollars in thousands)		
	FY1998	FY 1999	FY 2000
such as rental payments to GSA, expendable office supplies and materials, telecommunications and utilities, training, purchase of goods and services from Government accounts, printing and graphics, postage, maintenance and service agreements, and publications. The total costs for the Golden Office are split between the Energy Supply Appropriation and the Interior and Related Agencies Appropriation.	1,627	1,740	1,940
Total, Program Direction.	15,651	18,100	19,171

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits supports general pay increases, promotions, and within-grade increases for the balance of the staff and provides for staffing adjustments resulting from Workforce 21 plans.	+1,605
Travel	
■ The increase is primarily to support travel for escalating airfare and lodging costs with offsets from alternatives to travel such as video-conferencing.	+35
Support Services	
■ Reduction results from a decrease of $1,500,000 for electricity restructuring activities conducted in FY 1999 including $150,000 for restructuring activities of the California Energy Commission and an increase of $731,000 for crosscutting activities and ASEE initiatives in FY 2000. In FY 2000, the electricity restructuring activities are included in the Congressional Request under Solar Program Support.	-769
Other Related Expenses	
■ Increased costs supports activities such as computer workstations and network infrastructure technology upgrades to improve operational efficiencies, printing and reproduction, and funding for field office rent.	+200
Total Funding Change, Solar and Renewable Program Direction.	1,071

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Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Economic and Environmental Analysis	1,611	3,190	2,600	-590	-18.5%
Feasibility of Design Considerations	0	0	0	0	0%
Total, Technical Support Services	1,611	3,190	2,600	-590	-18.5%
Management Support Services					
Management Studies	1,400	2,500	2,321	-179	-7.2%
Training and Education	0	0	0	0	0%
ADP Support	150	200	200	0	0%
Administrative Support Services	0	0	0	0	0%
Total, Management Support Services	1,550	2,700	2,521	-179	-6.6%
Subtotal Support Services	3,161	5,890	5,121	-769	-13.1%
Use of Prior-Year Balances	0	0	0	0	0%
Total, Support Services	3,161[a]	5,890[a]	5,121[a]	-769	-13.1%

[a]Includes all funding for support service contractors, equipment, crosscutting activities, and Assistant Secretary initiatives.

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	0	0	5	+5	+100%
Working Capital Fund	1,581	1,690	1,690	0	0%
Printing and Reproduction	0	0	10	+10	+100%
Rental Space	46	50	120	+70	+140.0%
Software Procurement/Maintenance	0	0	50	+50	+100%
Activities/Capital Acquisitions	0	0	0	0	0%
Other	0	0	65	+65	+100%
Subtotal, Other Related Expenses	1,627	1,740	1,940	+200	+11.5%
Use of Prior-Year Balances	0	0	0	0	0%
Total, Other Related Expenses	1,627	1,740	1,940	+200	+11.5%

Federal Buildings/Remote Power Initiative

Mission Supporting Goals and Objectives

Program Mission

The Federal Buildings/Remote Power Initiative identifies and documents the economic benefit of using renewable energy technologies in applications that are currently cost-effective in the marketplace.

Program Goals and Objectives

Over the course of the Initiative, the program will demonstrate that renewable energy technologies are economical, reliable, and easy to operate.

Strategic Approach

The Federal building portion of the initiative provides financial cost-sharing assistance to Federal agencies that are seeking to incorporate renewable energy technologies into their power supply porfolio, such as wind development in San Clemente Island, California, solar domestic hot water collectors in Pearl Harbor, Hawaii; and geothermal gradient technologies at the Naval support facility in Diego Garcia. The Remote power portion of the initiative works to deploy renewable technologies--including solar, wind, fuel cell, and biomass power--in remote areas of the United States, and to develop and demonstrate their reliability, economics, and environmental benefits when compared to diesel generators.

Program Benefits

The Federal Buildings/Remote Power Initiative is supportive of the specific program mission, goals and objectives, and benefits of the participating technologies. In FY 2000, those specific sections are indicated in the individual requests of those participating technologies and in the Competitive Solicitation section of the Solar Program Support request.

Significant Accomplishments and Program Shifts

FY 1998 Accomplishments

- More than 70 applications were submitted under the Federal Buildings Initiative. Awards were made to 26 proposals resulting in 277 renewable systems being installed at Federal Facilities.
- Pursuant to a competitive Remote Power solicitation, 23 projects were funded resulting in a 10 to 1 leveraging of Federal funds.

FY 1999 Proposed Accomplishments

- The Federal Buildings Initiative will solicit additional proposals which will specifically include Native American projects involving Federal facilities.
- The Remote Power Initiative will conduct two project solicitations, one directed specifically toward Native American proposals for off-grid and grid-compatible projects on native lands.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Federal Buildings/Remote Power Initiative	4,864	4,000	0	-4,000	-100%
Total, Federal Buildings/Remote Power Initiative	4,864	4,000	0	-4,000	-100%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Federal Buildings/Remote Power Initiative			
■ Use financial incentives with the federal agencies at a maximum 20% cost share to leverage as much as $5 million in installed cost-effective projects. Provide technical assistance to build infrastructure for future purchases of solar energy. Prepare a report to Congress on the progress of implementing solar energy technologies in Federal agencies as directed by Executive Order 12902. Identify and fund 24 leveraged remote applications of solar and renewable energy to reduce or avoid diesel and gasoline power generation.	4,864	4,000	0
Total, Federal Buildings/Remote Power Initiatives.	4,864	4,000	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Federal Buildings/Remote Power Initiative	
■ No funding is requested under this line item. Instead, a more competitive, geographically and technologically diverse initiative (which also includes activities previously implemented under the Renewable Indian Energy Resources program) is proposed under the Competitive Solicitation section of the Solar Program Support line.	-4,000
Total Funding Change, Federal Buildings/Remote Power Initiative	-4,000

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(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Nuclear Energy					
Nuclear energy research and development					
Advanced radioisotope power system	36,800	37,000	37,000	—	—
Test reactor area landlord	7,307	6,766	9,000	2,234	33.0%
University reactor fuel assistance and support	7,000	11,000	11,345	345	3.1%
Nuclear energy plant optimization	—	—	5,000	5,000	—
Nuclear energy research initiative	—	19,000	25,000	6,000	31.6%
Total, Nuclear energy research and development	51,107	73,766	87,345	13,579	18.4%
Fast flux test facility (FFTF)	41,727	30,000	30,000	—	—
Termination costs	87,669	85,000	65,000	-20,000	-23.5%
Uranium programs	27,077	35,420	41,000	5,580	15.8%
Isotope support	18,944	21,500	21,000	-500	-2.3%
Program direction	24,393	21,242	24,960	3,718	17.5%
Subtotal, Nuclear Energy	250,917	266,928	269,305	2,377	0.9%
Use of prior year balances and other adjustments	-8,221	-3,546	—	3,546	100.0%
Total, Nuclear Energy	242,696	263,382	269,305	5,923	2.2%

Executive Budget Summary

Mission

The Office of Nuclear Energy, Science and Technology (NE) is home to much of the Federal Government's expertise in nuclear technology. This expertise is critical to assuring that, through its unique technical resources, the United States Government has the ability to respond to issues related to nuclear technology, including energy resource issues, matters of national security, nuclear engineering education, nuclear research, and the production and distribution of isotopes for medical and research uses. The United States relies on nuclear energy technology to provide about a fifth of its electricity, to provide critical isotopes for health care and industry, to explore the solar system, and to enhance the nation's security. Many other countries in the world are even more reliant on nuclear energy, and nuclear energy will continue to become increasingly important as the next century unfolds. Because of our reliance on this vital technology for economic, energy, and national security, the Department of Energy invests in services, products, and technologies that are beyond the capability of private industry alone.

This budget is the second to be prepared under the Government Performance and Results Act of 1993. The Act requires Government agencies to prepare strategic plans, performance plans, and performance reports that measure progress against goals. The Department's Strategic Plan consists of four Business Lines and a Corporate Management activity. NE's many diverse programs contribute to the success of all of the Department's business line goals. Working with industry, academia, the national laboratories, other Government agencies, and international partners, the Office has established goals that derive from the Department's strategic plan and guide our day-to-day activities. NE's goals by DOE Strategic Plan objective follow:

- *Energy Resources Objective 2* - Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.
  - Support innovative nuclear energy research and science (see Nuclear Energy Research Initiative)
  - Address critical technology issues associated with existing nuclear power plants (see Nuclear Energy Plant Optimization)
- *Science and Technology Objective 2* - Deliver leading-edge technologies that are critical to the DOE mission and the Nation.
  - Provide compact, safe, reliable nuclear power systems and related technologies to space, national security, and other customers (see Advanced Radioisotope Power Systems)
  - Develop technologies for production and application of isotopes, support vital, advanced research that applies to DOE-produced research isotopes, and ensure a reliable supply of medical, research, and industrial isotopes (see Isotopes Production and Distribution)
  - Manage DOE nuclear facilities in a safe, environmentally-sound, and cost effective manner and provide for the easy, cost-efficient use of relevant facilities by non-Federal researchers (see TRA Landlord)

- *Science and Technology Objective 4* - Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy.

  - Support improved U.S. nuclear education and research infrastructure (see University Reactor Fuel Assistance and Support)

- *Environmental Quality Objective 6* - Reduce the life-cycle costs of environmental cleanup.

  - Manage DOE facilities in a safe, environmentally-sound, and cost effective manner (see Uranium Programs)
  - Support implementation of the Secretary's anticipated April 1999 decision regarding future operation of FFTF for the future production of medical and industrial radioisotopes and other nuclear research and irradiation activities or permanent deactivation (see Fast Flux Test Facility)
  - Develop technologies needed to meet DOE spent nuclear fuel management and facility shutdown commitments (see Termination Costs)

In addition, NE is continuing to streamline its operations and organization to respond to the National Partnership for Reinventing Government objectives to make Government more effective, efficient, and responsive.

Strategy

In accomplishing its program objectives, the Office of Nuclear Energy, Science and Technology will engage research institutions in industry, U.S. universities, national laboratories, international organizations, and other countries in cooperative and collaborative efforts. The major program elements that contribute to the mission are: Advanced Radioisotope Power Systems, University Reactor Fuel Assistance and Support, TRA Landlord, Nuclear Energy Plant Optimization, Nuclear Energy Research Initiative, Termination Costs, Fast Flux Test Facility, Isotope Production and Distribution, Uranium Programs, and Program Direction. Program accomplishments that will enable NE to achieve it's mission are identified in the detailed program budget submissions. Programs that make up the NE budget are funded in the Energy Supply appropriation account.

Funding Summary

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Energy Supply			
Nuclear Energy R&D	54,246	73,766	87,345
Termination Costs	88,149	85,000	65,000
Fast Flux Test Facility	0	30,000 [a]	30,000
Isotope Support	19,473	21,500	21,000
Uranium Programs	44,633 [b]	49,000 [b]	41,000
Program Direction	21,000 [c]	24,700 [c]	24,960
Use of Prior Year Balances	-8,221	-3,546	0
Total, Energy Supply	219,280	280,420	269,305

Major Changes

The International Nuclear Safety Program and Highly Enriched Uranium Transparency Program have been moved to the Office of Nonproliferation and National Security (NN) and are not included in the FY 2000 Office of Nuclear Energy, Science and Technology budget request. In addition, the Department's budget includes a new program, the Nuclear Energy Plant Optimization program.

Major Issues

Fast Flux Test Facility (FFTF)

In the Spring of 1999, the Department will decide whether to permanently deactivate the FFTF or to conduct an Environmental Impact Statement to consider its operation in support of a range of national research reactor requirements. The FY 2000 request would fund minimum surveillance and maintenance of the FFTF to keep it in a safe and environmentally-compliant condition. The FY 2000 request is adequate to support minimum surveillance and maintenance of the facility, however funding above the FY 2000 request level would be required to restart, permanently shutdown, or maintain the facility in its current condition.

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[a] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

[b] Includes funding for Transparency Measures ($15.4 million in FY 1998 and $13.6 million in FY 1999) which transferred to the Office of Nonproliferation and National Security.

[c] Includes funding for Salaries, Benefits, Travel, and administrative expenses associated with the International Nuclear Safety Program and Transparency Measures which ($3.125 million in FY 1998 and $3.458 million in FY 1999, plus $192K in prior year funds) transferred to the Office of Nonproliferation and National Security.

Termination Costs

After completion of the operational phase of the electrometallurgical treatment technology demonstration project on spent Experimental Breeder Reactor-II (EBR-II) fuel, the Department will evaluate the suitability of the technology for full-scale treatment of the remaining inventory of EBR-II spent fuel. The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. The FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.

Site Funding

Site funding is provided in individual decision units.

Program Performance Measures

Key program performance measures used to judge the effectiveness of each program element are shown below. In addition to the technical effectiveness measures shown, program progress, customer satisfaction, and employee satisfaction are monitored to ensure that NE's programs are relevant and managed in a cost-effective manner.

Advanced Space Power Systems (ST-2)

- In FY 1998, executed a multi-year contract for the development of highly efficient radioisotope power systems in support of NASA's future mission requirements. **(Fully Successful)**
- In FY 2000, complete an Environmental Impact Statement and establish a Record of Decision on whether to proceed to develop a domestic plutonium-238 production capability for future space missions.
- Complete development and initiate operations for startup by the end of FY 2000 of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions.
- Develop a new technologically-advanced power system for 21st century space exploration and test a demonstration unit in FY 2000.

University Reactor Fuel Assistance and Support (ST-4)

- Support U.S. universities' nuclear energy research and education capabilities by:
  - Providing fresh fuel to all university reactors requiring this service.
  - Funding universities with research reactors for reactor upgrades and improvements (at least 20 in FY 1999; and at least 23 in FY 2000).
  - Partnering with private companies to fund DOE/Industry Matching Grants Program for universities (19 or more in FY 1999; and 17 or more in FY 2000).
  - Increasing the funding for Reactor Sharing in FY 1999 by 40 percent over FY 1998, and in FY 2000 by 20 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.

- Attract outstanding U.S. students to pursue nuclear engineering degrees by:
  - Increasing the number of Fellowships (from 14 in FY 1998 to 22 in FY 1999 and 18 in FY 2000).
  - Increasing the number of Nuclear Engineering Education Research Grants (in FY 1999 existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45).
  - Providing summer on-the-job training to junior and senior nuclear engineering scholarship recipients (29 in FY 1999, 25 in FY 2000).

Test Reactor Area Landlord (ST-2)

- Continue to upgrade the physical plant and site infrastructure in accordance with the long range plan to ensure safe and reliable operation of Test Reactor Area site facilities.

Nuclear Energy Plant Optimization (ER-2)

- In FY 1999, complete Memorandums of Understanding with the Nuclear Regulatory Commission and the Electric Power Research Institute (EPRI) to guide future implementation of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants.

- In FY 2000, implement a cooperative R&D program to address technical questions that could prevent continued operation of current nuclear plants by working with industry, universities, and national laboratories.

Nuclear Energy Research Initiative (ER-2)

- In FY 1999, establish a peer-reviewed Nuclear Energy Research Initiative, initially funded at $19 million, to select and conduct investigator-initiated innovative scientific and engineering research that will address the issues facing the future of nuclear power in the U.S., including proliferation concerns, economics, and the management of nuclear waste.

- In FY 2000, advance the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance in the design, development, and deployment of new reactor and nuclear fuel systems.

- In FY 2000, improve the understanding of reactor systems, component technology and nuclear fuel performance so one or more new reactor and one or more new fuel cycle concepts are identified which offer improved proliferation resistance, and the prospects of improved performance and efficiency, lower cost, and enhanced safety.

- In FY 2000, identify one or more proliferation resistant reactor concepts for low power and/or modular design applications.

Termination Costs (EQ-6)

- Complete the demonstration of the electrometallurgical spent fuel treatment technology by the end of FY 1999 using Experimental Breeder Reactor-II spent nuclear fuel.

- Complete the conversion and disposition of 100 percent of the secondary sodium coolant from the Experimental Breeder Reactor-II and 40 percent of the Fermi reactor sodium coolant in storage at Argonne National Laboratory-West.

- Determine by September 1999 whether electrometallurgical waste forms perform better than borosilicate glass under conditions consistent with the requirements being developed for the Department's geological repository license application.

- In FY 2000, complete the draining and processing of EBR-II primary sodium.

- In FY 2000, complete a National Environmental Policy Act review on the use of electrometallurgical technology to treat EBR-II and other sodium-bonded fuel in the Department's spent fuel inventory.

- In FY 2000, complete documentation of the operational phase of the demonstration project and resulting data from the electrometallurgical technology demonstration.

- Develop technical basis to support a DOE decision in FY 2000 on future application of the electrometallurgical treatment technology in the disposition of DOE spent nuclear fuels.

- In FY 2000, develop preliminary cost estimates and schedules for deactivating the Fuel Conditioning Facility and the Sodium Processing Facility.

Fast Flux Test Facility (EQ-6)

- Maintain the Fast Flux Test Facility in a safe, environmentally-compliant standby condition to permit implementation of an anticipated Secretarial decision in FY 1999 to deactivate or pursue potential restart to support a range of national research reactor requirements.

- In FY 2000, meet all Federal and State safety and environmental requirements for the Fast Flux Test Facility while implementing a Secretarial decision on the facility.

Isotope Production and Distribution (ST-2)

- In FY 1998, completed 80 percent of the Sandia Hot Cell Facility construction modifications and processing equipment installation activities needed to achieve the facility capability to process 100 percent of the U.S. demand for molybdenum-99. **(Fully Successful)**

- In FY 1999, initiate construction and commissioning of the Los Alamos Target Irradiation Station, improving isotope quality and improving operating efficiency.

- In FY 1999, complete equipment installation necessary for an emergency backup supply of molybdenum-99, issue a request for proposals to privatize molybdenum-99 production and business activities by May 1999, and after evaluation, award a contract by September 1999 to the most qualified firm.

- By the end of FY 2000, complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research.

- In FY 2000, implement the Advanced Nuclear Medicine Initiative by providing isotopes or financial assistance for up to five researchers.

- Complete privatization activities associated with production and sales of commercial isotopes by the end of FY 2000.

- Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. **(Fully Successful in FY 1998)**

- In FY 2000, invest in two new process development technologies as requested by researchers that enhance isotope production, services and delivery application systems.

- Respond to customer requests for information within 48 hours.

- Keep customer complaints to less than four percent of all deliveries made.

- Hold annual stakeholder meetings in conjunction with international and regional trade shows.

Uranium Programs (EQ-6)

- In FY 1998, completed the dilution of about 14 metric tons of excess highly enriched uranium (approximately 3.5 metric tons in FY 1998) to LEU at the Portsmouth Gaseous Diffusion Plant. **(Fully Successful)**

- In FY 1998, completed 80 percent of the final Programmatic Environmental Impact Statement for selecting the long-term management strategy for the depleted UF_6. **(Successful)**

- Meet all commitments to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride.

- In FY 2000, through the National Environmental Policy Act decision-making process, establish and begin implementing a long-term strategy for the management of the Department's depleted uranium hexafluoride inventories.

- Meet all legal commitments for post-retirement life and medical costs for retirees who supported the Uranium Enrichment Program before July 1, 1993.

- Maintain compliance with the Toxic Substances Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements and perform minimal corrective maintenance and inspections.

1-26-99

William D. Magwood, IV **Date**
Director, Office of Nuclear Energy, Science and Technology

Nuclear Energy R&D

Program Mission

The mission of the Nuclear Energy Research and Development program is to conduct advanced research and development in areas such as nuclear power and space power systems. In addition, this program supports nuclear engineering education and the enhancement of the Nation's nuclear science infrastructure.

The Nuclear Energy Research and Development program supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

- *Energy Resources Objective 2* - Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.

  - FY 2000 Strategy - Nuclear Energy Plant Optimization (NEPO)

  The Department will conduct government-industry cost-shared, peer-reviewed research and development to address the issues associated with long term operation of existing nuclear power plants and to apply new technology to improve plant reliability and availability. The program will be conducted on a 50-50 cost-shared basis with industry consistent with the updated Joint DOE-Electric Power Research Institute Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants to be issued in FY 1999. The Department and NRC coordinate program planning to assure that their research and development activities are complimentary, cost-effective, and without duplication. The Subcommittee on Operating Nuclear Power Plant Research, Coordination, and Planning of the Nuclear Energy Research Advisory Committee (NERAC) will provide the Department advice on the conduct of the NEPO research and development program and prioritize the research the Department will conduct with industry.

  - FY 2000 Strategy - Nuclear Energy Research Initiative (NERI)

  The Department will conduct investigator-initiated, peer-reviewed research and development at universities, national laboratories, and industrial organizations to advance the scientific knowledge base and develop new technologies that will, as anticipated by the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development, address the principal obstacles to the expanded use of nuclear energy, and advance the state of nuclear technology for a competitive marketplace. The Nuclear Energy Research Advisory Committee will provide the Department advice on the NERI research and development program.

- *Science and Technology Objective 2* - Deliver leading-edge technologies that are critical to the DOE and the Nation.

  - FY 2000 Strategy - Advanced Radioisotope Power Systems

  The Department will develop, demonstrate, test, and deliver advanced radioisotope power systems for space and national security missions.

  - FY 2000 Strategy - TRA Landlord

  The Department will identify, fund, and perform site maintenance, construction upgrade projects, and environmental compliance activities in accordance with DOE, Federal, and State requirements.

- *Science and Technology Objective 4* - Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy.

  - FY 2000 Strategy - University Reactor Fuel Assistance and Support

  The Department will support and promote university, college, and precollege technology programs that deliver information and contribute to learning in nuclear science and engineering education, enable advanced educational research opportunities, build capabilities at educational institutions, and improve educational opportunities for diverse groups.

Program Goals

Advanced Radioisotope Power Systems (ST-2)

- Provide compact, safe, reliable nuclear power systems and related technologies to space, national security and other customers.

University Reactor Fuel Assistance and Support (ST-4)

- Support improved U.S. nuclear education and research infrastructure.

TRA Landlord (ST-2)

- Manage DOE nuclear facilities in a safe, environmentally-sound, and cost effective manner and provide for the easy, cost-efficient use of relevant facilities by non-Federal researchers.

Nuclear Energy Plant Optimization (ER-2)

- Conduct cooperative, cost-shared, peer-reviewed R&D with industry to reverse the trend of premature closures of existing operating commercial nuclear power plants. This R&D will address the complex technical issues associated with managing the long-term effects of plant aging while improving plant reliability and efficiency.

Nuclear Energy Research Initiative (ER-2)

- Sponsor investigator-initiated, peer-reviewed R&D on new technologies that will address the principal obstacles to the future use of nuclear energy, and advance the state of nuclear technology for a competitive marketplace.

Program Objectives

Advanced Radioisotope Power Systems (ST-2)

- Maintain and enhance the U.S. capability to build advanced radioisotope power supplies for ongoing and future national security applications and NASA space exploration missions. *(Program Objective 1)*

- Develop a new advanced, highly efficient radioisotope power system that meets more stringent weight requirements of future space missions and reduces the amount of Pu-238 that is used. *(Program Objective 2)*

University Reactor Fuel Assistance and Support (ST-4)

- Provide fuel assistance, fellowship grants, reactor upgrade funding, and other assistance to U.S. universities, in cooperation with industry. *(Program Objective 1)*

TRA Landlord (ST-2)

- Ensure that TRA common use facilities and the utility infrastructure are maintained and operated to meet the requirements of tenant programs and in accordance with Federal and state environment, safety and health laws and regulations. *(Program Objective 1)*

Nuclear Energy Plant Optimization (ER-2)

- Implement selected activities from the DOE/EPRI Joint Strategic R&D Plan in cooperation with the utility industry, universities, national laboratories, and the Nuclear Regulatory Commission to develop advanced technologies and methodologies that will enhance nuclear generation capability, productivity, and economics. *(Program Objective 1)*

Nuclear Energy Research Initiative (ER-2)

- Develop new reactor concepts, and scientific and technology breakthroughs in nuclear energy which enhance the performance, efficiency, reliability, proliferation-resistance, and economics of nuclear power. *(Program Objective 1)*

Performance Measures

Advanced Radioisotope Power Systems (ST-2)

- In FY 1998, executed a multi-year contract for the development of highly efficient radioisotope power systems in support of NASA's future mission requirements. *(Performance Measure supports Program Objective 2)* **(Fully Successful)**

- In FY 2000, complete an Environmental Impact Statement and establish a Record of Decision on whether to proceed to develop a domestic plutonium-238 production capability for future space missions. *(Performance Measure supports Program Objective 1)*

- Complete development and initiate operations for startup by the end of FY 2000 of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions. *(Performance Measure supports Program Objective 1)*

- Develop a new technologically advanced power system for 21st century space exploration and test a demonstration unit in FY 2000. *(Performance Measure supports Program Objective 2)*

University Reactor Fuel Assistance and Support (ST-4)

- Support U.S. universities' nuclear energy research and education capabilities by: *(Performance Measure supports Program Objective 1)*
  - Providing fresh fuel to all university reactors requiring this service.
  - Funding universities with research reactors for reactor upgrades and improvements (at least 20 in FY 1999; and at least 23 in FY 2000).
  - Partnering with private companies to fund DOE/Industry Matching Grants Program for universities (19 or more in FY 1999; and 17 or more in FY 2000).
  - Increasing the funding for Reactor Sharing in FY 1999 by 40 percent over FY 1998, and in FY 2000 by 20 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.

- Attract outstanding U.S. students to pursue nuclear engineering degrees by: *(Performance Measure supports Program Objective 1)*
  - Increasing the number of Fellowships (from 14 in 1998 to 22 in FY 1999 and 18 in FY 2000).
  - Increasing the number of Nuclear Engineering Education Grants (in FY 1999 existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45).
  - Providing summer on-the-job training to junior and senior nuclear engineering Scholarship recipients (29 in FY 1999; and 25 in FY 2000).

TRA Landlord (ST-2)

- Continue to upgrade the physical plant and site infrastructure in accordance with the long range plan to ensure safe and reliable operation of Test Reactor Area site facilities. *(Performance Measure supports Program Objective 1)*

Nuclear Energy Plant Optimization (ER-2)

- In FY 1999, complete Memorandums of Understanding with the Nuclear Regulatory Commission and the Electric Power Research Institute (EPRI) to guide future implementation of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. *(Performance Measure supports Program Objective 1)*

- In FY 2000, implement a cooperative R&D program to address technical questions that could prevent continued operation of current nuclear plants by working with industry, universities, and national laboratories. *(Performance Measure supports Program Objective 1)*

Nuclear Energy Research Initiative (ER-2)

- In FY 1999, establish a peer-reviewed Nuclear Energy Research Initiative, initially funded at $19 million, to select and conduct investigator-initiated innovative scientific and engineering research that will address the issues facing the future of nuclear power in the U.S., including proliferation concerns, economics, and the management of nuclear waste. *(Performance Measure supports Program Objective 1)*

- In FY 2000, advance the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance in the design, development, and deployment of new reactor and nuclear fuel systems. *(Performance Measure supports Program Objective 1)*

- In FY 2000, improve the understanding of reactor systems, component technology and nuclear fuel performance so one or more new reactor and one or more new fuel cycle concepts are identified which offer improved proliferation resistance, and the prospects of improved performance and efficiency, lower cost, and enhanced safety. *(Performance Measure supports Program Objective 1)*

- In FY 2000, identify one or more proliferation resistant reactor concepts for low power and/or modular design applications. *(Performance Measure supports Program Objective 1)*

Significant Accomplishments And Program Shifts

Advanced Radioisotope Power Systems (ST-2)

- Initiate testing of a new advanced radioisotope power system that is lighter and requires less plutonium-238 to support future NASA missions.

- Initiate startup of a capability to recover plutonium-238 scrap for reuse for ongoing and future missions.

University Reactor Fuel Assistance and Support (ST-4)

- Award fellowships to outstanding and promising M.S. and Ph.D. students engaged in nuclear science research and training to ensure an adequate supply of trained nuclear personnel.

- Award Nuclear Engineering Education Research grants to competitively selected universities which promote innovative research in nuclear engineering technologies.

TRA Landlord (ST-2)

- Continue the final construction phases of the TRA Fire and Life Safety Upgrade construction project on schedule.

- Begin the construction phase of the TRA Electrical Utility Upgrade construction project.

Nuclear Energy Plant Optimization (ER-2)

- In FY 1999, update the DOE - Electric Power Research Institute (EPRI) Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants consistent with the recommendations of the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development and the NERAC Subcommittee on Operating Nuclear Power Plants Research, Coordination, and Planning.

- In FY 2000, implement the DOE - EPRI Strategic Plan working with national laboratories, the Nuclear Regulatory Commission, universities and industry conducting a cooperative R&D program guided by an industry/government coordinating committee.

Nuclear Energy Research Initiative (ER-2)

- In FY 1998, establish a Nuclear Energy Research Advisory Committee which will provide independent expert advice on the implementation of DOE nuclear energy R&D including the NERI program, with the first meeting held on November 17 and 18, 1998.
- In FY 1999, initiate the investigator proposed, peer-reviewed Nuclear Energy Research Initiative as recommended by the President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy Research and Development.
- In FY 2000, issue the second phase of grants and cooperative agreements under the investigator proposed, peer-reviewed Nuclear Energy Research Initiative.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Nuclear Energy R&D					
Advanced Radioisotope Power Systems	39,907	37,000	0	37,000	37,000
University Reactor Fuel Assistance and Support	7,000	11,000	0	11,000	11,345
Test Reactor Area Landlord	7,339	6,766	0	6,766	9,000
Nuclear Energy Plant Optimization	0	0	0	0	5,000
Nuclear Energy Research Initiative	0	19,000	0	19,000	25,000
Total, Nuclear Energy R&D	54,246	73,766	0	73,766	87,345

Climate Change Technology Initiative (CCTI)
Departmental Crosscut

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	$ Change	% Change
Energy & Water Development					
Energy Supply					
Solar and Renewable	269,904	336,000	398,921	62,921	18 7%
Nuclear Energy	0	0	5,000	5,000	100 0%
Subtotal, Energy Supply	269,904	336,000	403,921	67,921	20.2%
Science	0	13,500	33,000	19,500	144.4%
Total, Energy & Water	269,904	349,500	436,921	87,421	25 0%
Interior and Related Agencies					
Energy Conservation R&D	450,215	525,701	646,515	120,814	23.0%
Fossil Energy R&D	0	24,000	37,000	13,000	54.2%
Energy Information Administration	0	3,000	3,000	0	0.0%
Total, Interior and Related Agencies	450,215	552,701	686,515	133,814	24 2%
Total, DOE Climate Change Technology Initative	720,119	902,201	1,123,436	221,235	24.5%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	3,115	10	10	0	0.0%
Los Alamos National Laboratory	11,125	9,062	10,635	+1,573	+17.4%
Sandia National Laboratory	600	500	500	0	0.0%
Total, Albuquerque Operations Office	14,840	9,572	11,145	+1,573	+16.4%
Chicago Operations Office					
Chicago Operations Office	1,064	1,412	1,160	-252	-17.8%
Argonne National Laboratory	10	110	110	0	0.0%
Total, Chicago Operations Office	1,074	1,522	1,270	-252	-16.6%
Idaho Operations Office					
Idaho Operations Office	75	75	100	+25	+33.3%
Idaho National Engineering and Environmental Laboratory	12,107	14,600	17,445	+2,845	+19.5%
Total, Idaho Operations Office	12,182	14,675	17,545	+2,870	+19.6%
Nevada Operations Office	617	0	0	0	0.0%
Oakland Operations Office	5,828	7,906	5,580	-2,326	-29.4%
Ohio Operations Office					
Ohio Operations Office	30	0	0	0	0.0%
Mound Plant	7,900	7,800	8,000	+200	+2.6%
Total, Ohio Operations Office	7,930	7,800	8,000	+200	+2.6%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	4,400	6,302	8,740	+2,438	+38.7%
Oak Ridge Institute of Science and Education	575	1,025	1,150	+125	+12.2%
Total, Oak Ridge Operations Office	4,975	7,327	9,890	+2,563	+35.0%
Richland Operations Office					
Fluor Daniel Hanford	65	159	150	-9	-5.7%
Pacific Northwest National Laboratory	25	0	0	0	0.0%
Total, Richland Operations Office	90	159	150	-9	-5.7%
Savannah River Site	950	1,080	1,150	+70	+6.5%
All Other Sites	5,760	23,725	32,615	+8,890	+37.5%
Total, Nuclear Energy R&D	54,246	73,766	87,345	+13,579	+18.4%

Site Descriptions

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. A portion of the Plutonium Facility-4 at the Technical Area-55 at LANL is dedicated to plutonium-238 (Pu-238) processing. This capability is the only existing Pu-238 processing capability within the DOE complex and is used to process and encapsulate Pu-238 used in radioisotope power sources for the National Aeronautics Space Administration (NASA) space exploration missions and national security applications.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a U.S. Department of Energy scientific research laboratory located in New Mexico. SNL has unique analytical and testing capability used to evaluate radioisotope power system response during hypothetical launch accidents. These capabilities are used to support preparation of Safety Analysis Reports.

Argonne National Laboratory

Argonne National Laboratory (ANL) is a U.S. Department of Energy scientific research laboratory located in Argonne, Illinois. ANL has an ongoing program in cooperation with the governments of Germany, France and Japan in the area of international student exchange. This program sends highly qualified U.S. students to study nuclear engineering at facilities in the above three countries for a 3-4 month period and permits students from those countries to study nuclear engineering at ANL.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is an extensive research and engineering complex that has focused on some of the most advanced energy research in the world since 1949. In recent years, in addition to continued operation of complex nuclear and non-nuclear facilities, the INEEL has initiated technology development in applied environmental science and engineering. The Idaho Test Reactor Area (TRA) is located within the INEEL. Since the early 1950s, test reactors, laboratories, hot cells and supporting facilities have been built at TRA. The principal facility operating at TRA is the Advanced Test Reactor (ATR). The ATR is one of the world's largest and most advanced test reactors. It provides both vital irradiation testing for reactor fuels and core components and isotopes critically needed by medicine and industry. Other facilities currently operating on the site are: the ATR Critical Facility reactor, the TRA Hot Cells and the INEEL Applied Engineering and Development Laboratory. ATR operations and a wide variety of scientific research projects are planned to continue at TRA until well into the twenty-first century. The following facilities at TRA are shutdown in a surveillance and maintenance status awaiting decontamination and decommissioning: the Materials Test Reactor (MTR), the MTR Canal, the Engineering Test Reactor, the Coupled Fast Reactivity Measurement Facility, and the Advanced Reactivity Measurement Facility. TRA is operated for the

Department by Lockheed Martin Idaho Technologies Company. Responsibility for TRA Landlord resides with the Office of Nuclear Energy, Science and Technology. The TRA Landlord account provides for maintaining and upgrading TRA common use facilities and the utility infrastructure to ensure that programmatic, reliability and ES&H requirements are met.

INEEL manages the University Reactor Fuel Assistance Program to provide fuel for university test, research, and training reactors, the shipping of spent fuel from university reactors to Savannah River, and conversion of university reactors from high enriched uranium (HEU) to low enriched uranium (LEU). INEEL provides management, quality assurance, procurement, and technical assessment and review associated with the manufacturing, shipment, and receipt inspection assessment and evaluations of replacement fuel and the conversion of HEU fuel to LEU fuel for university reactors, and the shipping of spent fuel from these reactors.

Mound Plant

The Mound Plant is located in southwest Ohio with the city of Miamisburg. Previously, the main mission of the Mound Plant was to manufacture components for nuclear weapons for Defense Programs. As part of the Department's Non-nuclear Consolidation Plan, the Department decided to consolidate Defense Program activities to other sites and transferred the Mound site to the Office of Environmental Management for cleanup and transition of the facilities and properties to commercial operations. Only the facilities used to assemble and test radioisotope power systems used for NASA space exploration missions and national security applications remain in use by DOE Programs. The program is currently conducting a study on whether to consolidate and maintain the radioisotope power system assembly and test capability as a stand-alone operation at the Mound site or transfer the operation to another Department site.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) is a U.S. Department of Energy scientific research laboratory located in Oak Ridge, Tennessee. The ORNL has developed the unique capabilities for fabricating carbon insulator and iridium heat sources components for radioisotope power sources used for NASA space exploration missions and national security applications. These sophisticated heat source components are necessary for the safe operation of these power systems during normal operation and during launch, reentry or other deployment accidents.

Savannah River Site

The Savannah River Site is located in the Central Savannah River Area of South Carolina. The Office of Nuclear Energy, Science and Technology is maintaining the Plutonium Fuel Form Facility in a safe environmentally shutdown mode until the facility is transferred to the Office of Environmental Management for decontamination and decommissioning.

All Other Sites

Funding supports a commercial contract to develop national security missions and an Interagency Agreement with the Navy Department to provide specialized safety analyses for the Advanced Radioisotope Power Systems.

Includes funding for the Nuclear Energy Research Initiative which is a new competitive, investigator-initiated program in FY 1999 that is in the solicitation phase as this document is being prepared; therefore, the universities, national laboratories and industrial organizations who will perform the scientific and engineering research have not yet been identified.

Funding in FY 2000 for the Nuclear Energy Plant Optimization program is also shown in this category. Decisions regarding the specific 50-50 cost-shared, peer-reviewed research and development activities to be conducted and the performing organizations will be made following the FY 1999 update of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. In formulating this program, the Department will utilize the advice of the Subcommittee on Operating Nuclear Power Plant Research, Coordination and Planning of the Nuclear Energy Research Advisory Committee.

Funding is also included for nuclear engineering fellowships and scholarships for outstanding graduate and undergraduate students which is awarded through a peer-reviewed, competitive process. The peer review committee is composed of nuclear engineering professors representing a broad spectrum of nuclear engineering programs throughout the U.S. The funding is then administered and awarded by the South Carolina University Research and Education Foundation for the Department of Energy.

Advanced Radioisotope Power Systems

Mission Supporting Goals and Objectives

The Advanced Radioisotope Power Systems program supports the development, demonstration, testing, and delivery of power systems required by the United States to support space exploration and special national security activities. Radioisotope power systems, for example, are the enabling technology for space and national security applications requiring proven, reliable and maintenance-free power supplies capable of producing up to several kilowatts of power and operating under severe environmental conditions for many years. Previous NASA space exploration missions that have used radioisotope power systems include the Apollo lunar scientific packages and the Pioneer, Viking, Voyager, Galileo and Ulysses spacecrafts. More recent missions that used radioisotope power systems are the Mars Pathfinder mission launched in December 1996 and the Cassini mission to Saturn launched in October 1997. Without these power systems, many of the NASA missions to explore deep space and surfaces of planets and moons could not be performed. A recent General Accounting Office report entitled "Space Exploration - Power Sources for Deep Space Probes" dated May 1998, reinforces the need for these systems.

Through early FY 1998, the Department's activities have focused on: (1) fabricating and delivering to NASA three new radioisotope thermoelectric generators (RTGs) and 157 heater units for the Cassini mission; (2) supporting NASA in obtaining approval to launch Cassini; (3) implementing emergency preparedness plans and operations for the Cassini launch which occurred on October 15, 1997; and (4) supporting ongoing national security missions. In FY 1998 program emphasis transitioned from Cassini-specific efforts to maintaining the facilities and expertise that are required to produce radioisotope power systems and; (1) developing and testing an advanced power system for future NASA missions, such as the Europa Orbiter or Pluto/Kuiper Express, that will occur soon after the turn of the century; and (2) a new national security mission which will require delivery of several RTGs over the next decade.

With NASA's current emphasis on smaller and less expensive spacecraft, future missions require an advanced power system that is more efficient, lighter weight, and uses less radioisotope fuel. Efforts are underway to meet this requirement by developing an Advanced Radioisotope Power System (ARPS) that uses a new technology called AMTEC. In FY 2000, the program will complete fabrication and initiate testing of module units of this technology for future space missions, proceed to design and initiate fabrication of a full scale qualification unit of the advanced power system and continue safety testing in support of preparation of environmental documentation and Safety Analysis Reports to cover the near-term NASA space missions. For the new national security mission, the program will continue testing of the more efficient thermoelectric element that will be used for this mission, proceed with design and fabrication of a new, improved RTG, continue development of the safety test data and proceed with the preparation of the Safety Analysis Report.

In FY 2000, the program will also continue developing new, non-mission-specific technologies that could be used in power supplies that could cover a range of power levels required to support future NASA space missions. These technologies include advanced conversion concepts, new materials, and new heat sources. Also, the program will continue to maintain the Plutonium Fuel Form Facility at the Savannah

River site in an environmentally sound, safe shutdown condition until it is transferred to the Office of Environmental Management (EM) for decontamination and decommissioning.

The Department is charged with the development of nuclear technologies and systems by the Atomic Energy Act of 1954, as amended, and is authorized by the Act to possess special nuclear materials and operate nuclear facilities. To meet this charter, the Department has developed the program capabilities and facility infrastructure to produce and deliver radioisotope power systems. To maintain the long-term viability for the program, and the space exploration and national security missions it enables, the Department must maintain these capabilities and the associated facility infrastructure as the sole national capability to produce radioisotope power systems.

The facility infrastructure for producing the power systems has been consolidated over the past few years to the three main operations described below. Without this infrastructure, radioisotope power systems cannot be produced, and without these power systems, critical national security activities and NASA missions to explore deep space and the surfaces of neighboring planets will not be possible. The facility infrastructure which must be sustained includes:

- **Iridium and Carbon Heat Source Component Fabrication Facilities at Oak Ridge National Laboratory**

  The Oak Ridge National Laboratory (ORNL) has developed the unique capability of fabricating carbon insulators and iridium cladding used to encapsulate and contain the plutonium-238 (Pu-238) pellets. These sophisticated heat source components are necessary for the safe operation of the radioisotope heat source during normal operation and during launch, reentry or other deployment accidents. The Department maintains its capabilities in this area through small scale production campaigns of these components for upcoming space missions and terrestrial applications. Advanced fabrication processes are being developed to improve the performance and to reduce the cost of fabricating these components. The materials properties of these components are characterized for input to mission safety analyses for the launch or deployment approval process. ORNL also performs materials testing and precious metal iridium inventory management for the Department's activities at other sites.

- **Plutonium-238 Processing and Encapsulation Facilities in the Technical Area-55 Complex at Los Alamos National Laboratory**

  The Department maintains a facility within the Plutonium Facility-4 at the Technical Area-55 at the Los Alamos National Laboratory (LANL) dedicated to Pu-238 processing. This is the only facility in the United States that can perform these operations. LANL receives the Pu-238 powder, performs incoming inspections, processes the powder through a complex set of operations to a pellet form, encapsules the pellets in the iridium cladding fabricated at ORNL, performs final inspection, and ships the encapsulated pellets to Mound (see following discussion) for assembly into heat sources. The Department maintains these operations through small-scale fabrication campaigns of encapsulated pellets for use in upcoming missions. LANL maintains the Pu-238 inventory for the Department. A Pu-238 scrap recovery line is being developed to recycle scrap for use on future programs. Startup activities to bring the scrap recovery line to full operation should be initiated by

the end of FY 2000. To minimize waste disposal costs, a new process is being developed to recover Pu-238 from the waste and dispose of the remaining byproducts. LANL also conducts safety and qualification tests on Pu-238 heat source components. LANL also fuels and assembles radioisotope heater units used on NASA space missions.

An important element of maintaining the operational readiness of the facilities is the repair and upgrading of equipment. Over the next several years, LANL will complete the program to replace equipment and glove boxes that have reached their useful lifetimes as a result of the large Pu-238 processing campaign required for the Cassini mission.

- **Heat Source and Power System Assembly and Testing Facilities at the Mound Site**

The Department maintains and operates facilities at the Mound site for heat source and power system assembly and testing. These operations have been primarily conducted in two buildings identified as Buildings 38 and 50. Heat source modules were assembled in Building 38 as iridium encapsulated Pu-238 pellets were received from LANL and carbon components were received from ORNL. The national security power systems were also assembled in Building 38. The assembly of the heat sources into the generators and the acceptance testing and related functions are carried out in Building 50. This building is totally dedicated to the radioisotope power systems program. Since the power systems program used only a small part of Building 38, and this is an old building that is scheduled for demolition by EM as a part of the overall cleanup of the Mound site, the Department is consolidating the power systems efforts from Building 38 into Building 50. This consolidation will be completed in early FY 2000 to allow EM to proceed with their planned decontamination and decommissioning of Building 38.

The Department conducted an evaluation of transferring and consolidating the Mound operations at another site to streamline program operations and reduce infrastructure costs. Seven other sites as well as the option of remaining at Mound were included in the evaluation. Preparation of an Environmental Impact Statement (EIS) was initiated on five sites and the Mound site as a no action alternative. Since the rest of the Mound site is scheduled for cleanup and transfer to the private sector, the program efforts would become a stand alone operation at Mound. This stand alone operation at Mound is being more fully analyzed in terms of cost, safety, safeguard and security issues and a decision to proceed with the EIS is pending.

As part of its overall support of the power systems program, Mound also stores and maintains a spare RTG used for the Cassini Mission in monitored storage. In addition, Mound is developing new fabrication processes, including performing weld development studies for the heat source for the RTGs for the new national security mission and developing plans for the assembly and testing of the new advanced power system the Department is developing for future NASA missions. Mound also fabricates components for heater units which are fueled and assembled at LANL.

Another key issue facing the program is assuring that there is a long term supply of the Pu-238 isotope that is used in these power systems. Most of the current inventory of Pu-238 was produced in the reactors and processing facilities at Savannah River. However, the facilities used to produce the material are either shutdown or being phased out. The planned space and national security missions will exhaust the current inventory by the middle of the next decade and, unless an assured supply is established, the ability to support future space missions will be lost. Therefore, the Department is considering the potential of establishing a domestic supply using existing facilities to produce this non-weapons form of plutonium. An Environmental Impact Statement is being prepared as part of the planning and decision process.

The Department recognizes the need to minimize the costs associated with maintaining the programs and facility infrastructure associated with this program. As requested by Congress in the FY 1999 report language, a summary report has been prepared and transmitted separately that describes the action taken and considered to streamline the program to minimize costs.

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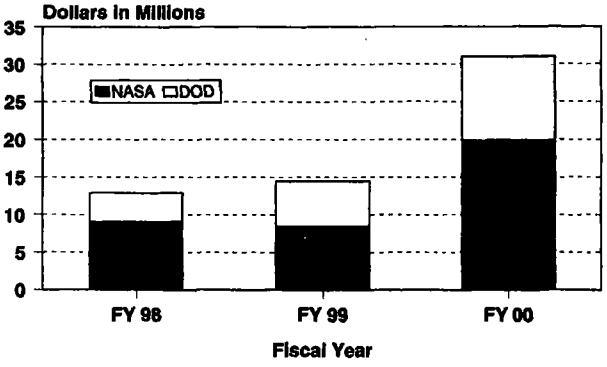
Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Radioisotope Power Systems	32,097	29,200	27,600	-1,600	-5.5%
Special Applications	2,000	2,000	2,000	0	0.0%
Plutonium-238 Acquisition and Processing	5,810	5,800	7,400	+1,600	+27.6%
Total, Advanced Radioisotope Power Systems	39,907	37,000	37,000	0	0.0%

User Funding*



* The funds appropriated in Energy Supply are used to sustain the program and facility infrastructure that allows the Department to fulfill its charter to maintain radioisotope power system production capabilities for future space and national security missions. The user funding is provided to DOE by the sponsoring mission agencies for mission-specific development and hardware fabrication efforts. In FY 2000, NASA is expected to provide DOE with $19.9 million and DOD with $11.1 million.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Radioisotope Power Systems			
■ Provide RTGs that satisfy NASA power requirements for the Cassini mission and supported Cassini launch in October 1997	3,974	0	0
■ Maintain the program and facility operations and capabilities for current and future space and national security missions. Prepare facility operations for conduct of new NASA space missions and the new national security mission.			
▸ Maintain iridium and carbon heat source component operations at ORNL. In FY 1998, 1999 and 2000 conduct production campaigns to fabricate components for new missions. In FY 1999, implement improved production process and complete qualification runs in FY 2000.	3,300	3,350	3,500
▸ Maintain Pu-238 processing and encapsulation operations at LANL. Conduct production runs in FY 1998, 1999, and 2000 to encapsulate Pu-238 for new missions. In FY 1999, initiate safety and qualification testing of Pu-238 purchased from Russia. In FY 2000, complete qualification of Russian Pu-238 and initiate production of heater units for new missions.	6,800	7,300	7,050
▸ Maintain and operate Mound facilities and maintain shipping casks. In FY 1998, 1999, and 2000 conduct production runs for heat sources. In FY 2000, initiate preparation of assembly and testing operations for new NASA space missions and new national security missions.	7,400	7,700	7,800

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Perform safety model development and analyses, review safety analyses reports, conduct performance and safety testing of advanced concepts, perform theoretical performance analyses for advanced concepts, perform future missions conceptual design studies, prepare environmental documentation, and perform safety analyses and prepare safety analyses reports for shipping casks, maintain and certify shipping casks, maintain the PuFF facility in a safe shutdown mode, and conduct special studies	5,172	2,570	2,600
▸ Continue program with industry, universities and laboratories to develop advanced technologies (converters, materials) for use in power systems with ranges of power levels for future NASA missions. Demonstrate use of a light weight, highly efficient converter technology for use in a power system for space or terrestrial mission. Develop and test heat sources for advanced systems	2,597	5,421	5,510
▸ Continue facility modifications to allow consolidation of heat source and RTG assembly and testing operations into a single facility at the Mound Plant site	1,854 [a]	700 [a]	0
▸ Capital equipment funding for routine equipment replacement and procuring equipment for developing, assembling and testing new advanced power system	1,000	2,000	1,000
▸ FY 99/00 Small Business Innovative Research and Small Business Technology Transfer programs	0	159	140
Total, Radioisotope Power Systems	32,097	29,200	27,600

[a] The Department had notified Congress that this funding was being redirected to prepare an Environmental Impact Statement on the potential relocation of Mound plant functions. If a decision is made to remain at Mound, the remaining funding will be used to support consolidation at Mound for stand alone operation, including updating Mound environmental documentation.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Special Applications			
■ Satisfy user requirements to support ongoing and new national security programs	2,000	2,000	2,000
Plutonium-238 Acquisition and Processing			
■ Develop Pu-238 scrap and waste recovery and disposal capabilities at Los Alamos National Laboratory for reuse of Pu-238 for future national security and NASA space missions			
▸ Perform design and safety analyses for scrap recovery line, purchase glove box equipment and initiate installation and perform bench scale testing for process equipment	1,575	0	0
▸ Complete installation of glove boxes, complete bench scale testing and initiate installation of process equipment	0	2,300	0
▸ Complete installation of scrap recovery line and initiate startup activities for full operation. Initiate conceptual design and safety analyses for waste recovery line and waste recovery by-products disposal. Procure long-lead time equipment.	0	400	2,100
▸ Capital equipment funding	1,625	400	260
■ Evaluate and implement options for meeting near-term and long-term supply needs for Pu-238			
▸ Evaluate use of DOE reactor facilities for domestic production of Pu-238 and initiate preparation of conceptual design and preliminary cost estimate for the processing lines for target fabrication, target processing and neptunium storage facilities at the HFIR complex at ORNL	1,150	0	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Continue evaluation of DOE reactor facilities for domestic production of Pu-238, develop test target design, complete conceptual design of processing and storage facilities, and prepare environmental impact statement for domestic production of Pu-238.	1,460	2,700	0
▸ Maintain option for a domestic supply option by obtaining a Record of Decision for domestic production of Pu-238, initiating test target irradiations, and proceeding with detail design of processing and storage facilities that will be built if decision is made to proceed	0	0	4,290
▸ Capital equipment funding	0	0	750
Total, Plutonium-238 Acquisition and Processing	5,810	5,800	7,400
Total, Advanced Radioisotope Power Systems	39,907	37,000	37,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Radioisotope Power Systems	
■ The funding reduction defers lower-priority capital equipment expenditures.	-1,600
Plutonium-238 Acquisition and Processing	
■ The increase in the Plutonium Acquisition and Processing sub-element is to ensure a long-term supply of Pu-238 by establishing a domestic Pu-238 production capability. With the expected new near-term space and national security missions, the current inventory of Pu-238 will be exhausted. In early FY 2000, the Environmental Impact Statement will be completed and a Record of Decision issued on whether to proceed to establish a domestic Pu-238 production capability. This capability is required to replenish the inventory and establish an assured long-term supply of Pu-238 for future missions.	+1,600
Total Funding Change, Advanced Radioisotope Power Systems	0

University Reactor Fuel Assistance and Support

Mission Supporting Goals and Objectives

To retain the capability in the U.S. to conduct research, address pressing environmental challenges, and help preserve the nuclear energy option, we must maintain the infrastructure necessary to educate and train the next generation of scientists and engineers. The University Reactor Fuel Assistance and Support program provides funding for our university nuclear engineering programs and university research reactors which play a major role in providing this education and training.

University nuclear engineering programs supply highly skilled workers to companies in fields such as electricity generation, medical research and supply, environmental restoration, and advanced materials, as well as to government agencies and national laboratories. To help ensure the continued viability of these programs, the Department provides assistance through nine distinct programs which include the DOE/Industry Matching Grants program. The Department also provides research funding to faculty through the Nuclear Engineering Education Research (NEER) program, and academic assistance through our Scholarships and Fellowships program for outstanding students in nuclear engineering and health physics.

University research reactors in the United States form a fundamental and vital component of our national research and education infrastructure. Research conducted using these reactors is critical to many national priorities such as health care, materials science, and energy technology. Currently, there are 28 operating university research reactors on 26 campuses in 20 states. University reactors are the source of neutrons for research in such diverse areas as medical isotopes, human health, life sciences, environmental protection, advanced materials, lasers, energy conversion, and food irradiation. University research reactors directly support the development of highly qualified, technically knowledgeable personnel needed by national laboratories, private industry, the Federal government and academia, for basic and applied research critical to U.S. technological competitiveness. In addition , with the help of the Reactor Sharing program, many of the reactors serve as centers for education programs offered to other colleges and universities and high school students and teachers who come to the reactor for instructional programs and research.

The University Reactor Fuel Assistance and Support program provides funding for shipment of fresh fuel to and spent fuel from university research reactors through our Fuel Assistance program allowing universities to continue their important research and education activities. The Reactor Upgrade program also provides funding for equipment upgrades at the reactors, to increase their value as research tools, supports students and faculty in the area of radiochemistry through our Radiochemistry program, provides educational assistance primarily in the form of scholarships and fellowships to minority, Hispanic and American Indian students within our Minority Support program and a new initiative in FY 2000 provides funding to prepare students for nuclear engineering and science careers by way of the Nuclear Education Recruitment program.

Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
University Reactor Fuel Assistance and Support	7,000	11,000	11,345	+345	+3.1%
Total, University Reactor Fuel Assistance and Support	7,000	11,000 [a]	11,345	+345	+3.1%

[a] Excludes $225K included in a FY99 reprogramming.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
University Reactor Fuel Assistance and Support			
■ Continue to supply fresh fuel to and ship spent fuel from all university reactors requiring these services and begin conversion of a university reactor from high enriched uranium (HEU) to low enriched uranium (LEU) during FY 2000.	2,100	2,300	2,800
■ Continue the Matching Grants Program in FY 2000, which supports education, training, and innovative research at participating universities. Provide grants of up to $50,000 (which are matched by industry) to 17 universities in FY 1998, up to19 or more in FY 1999 and 17 or more in FY 2000. An evaluation of the five year trial of the matching grants program conducted in FY 1997 recommended continuation and expansion of the program.	800	1,000	800
■ Provide fellowships in FY 2000 for outstanding and promising United States M.S. and PhD. students engaged in nuclear science research and training at multiple U.S. universities and scholarships to undergraduate students. Also support development of education programs in nuclear engineering and related scientific fields at minority serving institutions. A total of 14 fellowships and 62 scholarships were awarded for FY 1998, approximately 22 fellowships and 67 scholarships are expected for FY 1999 and 18 fellowships and 62 scholarships are planned for FY 2000.	1,100	1,400	1,300
■ The Reactor Sharing program allows students and faculty at institutions without reactors to have access to university reactors for training, education, and research purposes. This program also allows the universities with reactors to conduct educational outreach programs in their local communities. In FY 1998, FY 1999 and FY 2000, 23 grants are planned with the level of funding for individual reactors varying each year.	500	700	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue in FY 2000 with the third year of the reactor upgrade program to assist in addressing the backlog of maintenance and upgrade of items confronting university-owned research reactors. The program provides for replacement of outdated equipment, maintenance of reactor systems, and upgrading of experimental capabilities at 16 university reactors in FY 1998, and approximately 20 and 23 reactors in FY 1999 and FY 2000 respectively. The purpose of this program is to ensure that these valuable educational and research tools are available into the next decade	300	800	845
■ The Nuclear Engineering Education Research Grants Program was reinstated in FY 1998 with the awarding of 19 grants. In FY 1999, existing and new grants will total 43; and in FY 2000 existing and new grants will total approximately 45 to provide for innovative research in nuclear engineering at U.S. universities	2,200	4,500	4,500
■ Begin a program in FY 2000 to support nuclear engineering education recruitment activities in conjunction with a professional society with expertise in nuclear science and technology to ensure a highly informed group of students entering university nuclear engineering and related scientific courses of study	0	0	200
■ In FY 2000, the radiochemistry program will continue to provide faculty support and student fellowships and scholarships to help educate a new generation of radiochemists to address the technical challenges associated with radioactive wastes and contaminated sites	0	300	300
Total, University Reactor Fuel Assistance and Support	7,000	11,000*	11,345

* Excludes $225K included in a FY99 reprogramming.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
University Reactor Fuel Assistance and Support	
■ Increase in reactor fuel account, reactor upgrades and a new initiative in nuclear engineering education recruitment with decreases in matching grants, fellowships and scholarships, and reactor sharing	+345
Total Funding Change, University Reactor Fuel Assistance and Support	+345

Test Reactor Area Landlord

Mission Supporting Goals and Objectives

The Idaho Test Reactor Area (TRA) is located within the Idaho National Engineering and Environmental Laboratory (INEEL). Since the early 1950s, test reactors, laboratories, hot cells and supporting facilities have been built and operated there. Currently operating on the site are: (1) the Advanced Test Reactor (ATR), which is the world's largest and most advanced test reactor, (2) the ATR Critical Facility reactor, (3) the TRA Hot Cells which process and ship vital isotopes for medicine and industry produced in the ATR, (4) the INEEL Applied Engineering and Development Laboratories and (5) a major industrial machine shop facility that supports not only TRA facilities but also performs support work for all of INEEL. Vital nuclear reactor testing, isotope production and other scientific research are planned to continue until well into the twenty-first century.

TRA Landlord Mission Supporting Goals and Objectives:

- Ensuring an adequate maintenance program is conducted to maintain the site common facilities and utility infrastructure in accordance with DOE, Federal and State of Idaho environmental, safety and health (ES&H) standards and regulations and to ensure reliable program support for tenant programs.

- Ensuring an adequate upgrade construction program is conducted to the site buildings and utility infrastructure to meet programmatic, reliability and ES&H requirements. Most of the TRA Landlord buildings and utility systems are more than 40 years old, and, given the projected indefinite continuing mission of the site, upgrades must be made to the buildings and especially to the utility infrastructure as these facilities and systems are at or near the end of their useful life or do not meet current ES&H requirements.

- Ensuring environmental compliance for the site including identification of legacy waste and mitigation in accordance with DOE, Federal and State of Idaho regulations and specific legal agreements entered into with the State of Idaho.

Planned FY 2000 TRA Landlord accomplishments include: providing construction projects operating support, conducting routine maintenance and repair on common site facilities and utility systems, ensuring site environmental compliance including cleanup of legacy waste, procurement of General Purpose Capital Equipment (GPCE), and conducting General Plant Projects (GPP) and Line Item Construction Projects (LICP). The FY 2000 budget provides for continuation of the LICP to improve fire safety for TRA site to meet current Federal, State and Department of Energy (DOE) fire safety standards. In July, 1998, a malfunctioning CO2 fire suppression system resulted in a fatality and multiple injuries. A Type A investigation was conducted by the Office of Environment, Safety and Health and appropriate actions were taken to ensure such an accident would not occur again. The principal fire safety improvements in FY 2000 will be continuing the process of upgrading fire doors, fire suppression systems, alarm systems, and smoke detectors. The FY 2000 budget provides for continuation of the TRA Electrical Utility Upgrade LICP to reconfigure the 40 year old electrical utility system to meet current needs and to replace aged switchgear, panels and transformers for which

maintenance parts are no longer available or which are at end of useful life and beyond economical repair. The planned GPPs for FY 2000 are to provide upgrades to the TRA Retention Basin, the TRA Evaporation Pond and the TRA Laboratory Radioactive Effluent System.

The TRA Landlord line item has been underfunded for several years. It is important that the Department take action in FY 2000 to address the aging infrastructure of the site to ensure that programmatic, environment, safety and health requirements are met.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations and Maintenance	2,914	4,000	6,070	+2,070	+51.8%
Construction	4,425	2,766	2,930	+164	+5.9%
Total, Test Reactor Area Landlord	7,339	6,766	9,000	+2,234	+33.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Operations and Maintenance			
■ Provide engineering planning, development, design, project validation and construction management for the Fire & Life Safety LICP, the Electrical Utility Upgrade LICP and GPP projects	841	815	950
■ Continue required preventive maintenance and necessary routine repair activities to correct site deficiencies identified during facility inspections and assessments to ensure that TRA Landlord facilities are maintained in compliance with programmatic and ES&H requirements	584	472	570
■ Continue to procure GPCE to support TRA Landlord requirements	90	140	240
■ Conduct GPP such as the TRA Retention Basin Upgrade, the TRA Evaporation Pond Upgrade and the TRA Laboratory Radioactive Effluent System Upgrade	974	1,290	1,110
■ Continue environmental compliance legacy waste cleanup activities in accordance with DOE, Federal and State of Idaho regulations and specific agreements with the State of Idaho.	425	1,283	3,200
Total, Operations and Maintenance	2,914	4,000	6,070
Construction			
■ Continue the TRA Fire & Life Safety LICP	4,425	2,425	1,500
■ Continue the TRA Electrical Utility Upgrade LICP	0	341	1,430
Total, Construction	4,425	2,766	2,930
Total, Test Reactor Area Landlord	7,339	6,766	9,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Operations and Maintenance	
■ Construction operating support escalated for inflation and project requirements	+135
■ Maintenance and repair increased due to projected work scope	+98
■ GPCE increased due to planned requirements	+100
■ GPP decreased due to planned requirement.....	-180
■ Projected requirements for Environmental Compliance increased in FY 2000 due to mandatory legacy waste cleanup activities.	+1,917
Total, Operations and Maintenance	+2070
Construction	
■ TRA Fire & Life Safety LICP decreased for next phase of work.	-925
■ TRA Electrical Utility Upgrade LICP increased for next phase of work.	+1,089
Total, Construction	+164
Total Funding Change, Test Reactor Area Landlord	+2,234

95-E-201, Fire and Life Safety Improvements, Idaho National Engineering and Environmental Laboratory, Idaho

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

The Office of Nuclear Energy, Science and Technology (NE) directed changes to the Funding Appropriation Profile results in a 24 month schedule increase and Total Project Cost (TPC) increase of $292K.

Activities are progressing based on the approved requirements. The work is being accomplished based on the Conceptual Design documents and developed detail Title II Design packages. The Project has been divided into eleven (11) work package design, construction and close out activities, to allow for administration, control and coordination with the operating Test Reactor located at the Test Reactor Area (TRA) and other interface issues at the TRA facility. This work corrects numerous Life Safety and Fire Protection and Detection deficiencies that were identified within the TRA operational areas, including the Advanced Test Reactor (ATR), that were identified in eight fire safety assessments including the DOE Tiger Team Assessment. The work to correct the deficiencies is to maintain the safety of site operations and ensure public safety is not jeopardized. The activities within the ATR are to maintain the facility within the requirements as defined within the Technical Specification Requirements, Facility Safety Analysis Requirements (TSR/SAR) and other documents that make-up the ATR Safety Authorization basis for operation.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1995 Budget Request *(Preliminary Estimate)*	2Q 1995	1Q 1997	3Q 1995	4Q 2000	21,320	23,630
FY 1996 Budget Request	2Q 1995	1Q 1997	3Q 1995	4Q 2000	15,472	17,002
FY 1997 Budget Request	2Q 1995	1Q 1997	3Q 1995	4Q 2000	15,446	17,011
FY 1998 Budget Request	2Q 1995	1Q 1997	3Q1995	4Q 2000	15,446	17,011
FY 1999 Budget Request	2Q 1995	1Q 1997	3Q1995	4Q 2000	15,446	17,011
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1995	4Q 1999	3Q 1996	4Q 2001	15,446	17,322

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1995	$ 867	$ 867	$ 603
1996	693	693	416
1997	25	25	46
1998	175	175	22
1999	45	45	216
2000	12	12	12
Construction			
1995	829	829	577
1996	1,207	1,207	724
1997	975	975	1,773
1998	4,250	4,250	526
1999	2,380	2,380	6,543
2000	1,488	1,488	1,488
2001	2,500	2,500	2,500

3. Project Description, Justification and Scope

Project Description

This project provides for the Design, Procurement, Construction and System Operational testing activities to correct fire and life safety code deficiencies at the TRA. Specific improvements are:

- Modifications to or replacement of deficient fire barriers to meet code and reduce Maximum Possible Fire Loss (MPFL) or smoke damage impacts to personnel and property.
- Additions, modifications, or new automatic fire suppression systems to meet code requirements for operations personnel life safety and to reduce Maximum Credible Fire Loss (MCFL) potentials to acceptable improved risk levels as required by DOE Order 5480.7.
- Additions or modifications to existing building heating and ventilating systems to control fire and smoke spread, smoke detection, upgrades or replacement of interior doors to provide smoke and fire barriers, protection of structural support members, and sealing of penetrations in fire barriers (existing walls and floors) to provide effective control of property damage and life safety protection.
- Modifications and expansion of the fire detection and alarm system and removal of obsolete equipment to meet codes and provide TRA system compatibility with the Idaho National Engineering and Environmental Laboratory (INEEL) wide system.

- Addition of fully redundant water supply, consisting of new Underwriters Laboratories (UL)-listed and Factory Mutual (FM)-approved fire pumps and a tank capable of delivering 100 percent of the highest demand for volume, pressure, and duration, to meet reliability requirements of DOE Order 5480.7.

- Additions or modifications to existing fire water distribution piping, hydrants and valves.

- Upgrades to the site Raw Water Storage Tanks. The tanks are old and have conical steel roofs which have deteriorated to the point that the corrosion is exposing TRA drinking water to rain, biological contamination and ATR Cooling tower exhaust condensate. The tanks require rework to meet the existing TRA seismic qualification requirements. The tanks are designated as the ATR emergency core cooling storage system and are required to be in service and provide for water storage during reactor operations and shutdown modes.

Justification

To upgrade TRA's Fire and Life Safety Systems for compliance with applicable sections of the Code of Federal Regulations (CFR), DOE fire safety requirements, the National Fire Protection Association (NFPA) Codes and Standards including the National Electrical Code (NEC). The need for corrective actions were defined by the INEEL Operating Contractor and by numerous DOE fire safety assessments.

Regulation Drivers

The NFPA Life Safety Codes (NFPA Standard 101), NFPA Fire Protection/Prevention/Detection requirements, the NEC (NFPA Standard 70), Occupational Safety and Health Administration (OSHA) (29 CFR 1910), and DOE Order 5480.7.

National Environmental Policy Act (NEPA) documentation requirements - Finalization of Air Permit Completed in FY98. (As tasks are worked, continual review to ensure that all NEPA requirements are identified and met is accomplished.)

Raw Water Storage Tank System required to meet DOE seismic and water storage requirements.

Radiological Controls

Work is being performed within radiological buffer areas. There is a potential for encountering radioactive contamination. This issue will be handled with applicable radiological surveys, work reviews and zoning of work area accordingly.

Asbestos

Asbestos and asbestos contaminated materials will be encountered on this project. Proper controls, abatement work instructions and disposal methods will be performed in accordance with LMITCO Industrial Hygiene and Environmental requirements in accordance with 29CFR 1926.1101, ASBESTOS.

Lead

Lead painted materials will be encountered on this project. Proper controls, abatement work instructions and disposal methods will be performed in accordance with LMITCO Industrial Hygiene and Environmental requirements in accordance with 29CFR 1926.62, LEAD.

Scope

Tasks initially defined the activities that reflected work areas and the priority of needed corrective actions. The directed funding profile by budget year requires work be sequenced and structured to reflect the available budget funding. The addition of the work defined as tasks required an integration into the phased work schedule of the TRA Fire and Life Safety project. The defined budget profile has required that each phase be evaluated based on the planned reactor operations schedule and FY budget.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design Costs (Design Drawings and Specifications)	1,601	1,601
Design Management Costs (0.2% of TEC)	32	32
Project Management Costs (0 4% of TEC)	68	68
Total, Design and Management Costs (11.0% of TEC)	1,701	1,701
Construction Phase		
Improvements to Land	155	155
Buildings	8,160	8,160
Utilities	3,137	3,137
Standard Equipment	648	648
Construction Management (1.6% of TEC)	251	251
Project management (4.6% of TEC)	711	711
Total, Construction Costs	12,100	12,100
Contingencies (4.4% of TEC)	683	683
Total, Line Item costs (TEC)	15,446	15,446

5. Method of Performance

The Department of Energy Idaho Operations Office (DOE-ID) shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE-ID project management shall be performed by the Construction Management Group in the Office of Program Execution. Safety, environmental, and other project support shall be furnished to the project on an as-needed basis by the DOE-ID matrix organization.

The design, project management, and construction management shall be performed under a negotiated contract with the operating contractor. Construction and procurement shall be accomplished by fixed price contracts awarded on the basis of competitive Best Valve bidding process. Inspection may be performed by another agent. Check-out of systems, and maintenance of the completed project shall be performed by the operating contractor.

The INEEL Operating Contractor's (OC) Project Manager shall be responsible for the entire project: design; all construction activities at the TRA/INEEL site, construction subcontracting, direction of the activities of construction subcontractors, and performance and management of construction activities as required to complete the project in a timely, safe, and cost-effective manner.

The Life Safety deficiencies identified have been divided to be work packages (tasks) based on areas and type of work activity to allow for performance under a controlled work plan and the defined priority of the identified deficiencies. The designs are evaluated based on the method of work and area controls. The packages have been developed for subcontracting actions to utilize the available qualified craft within the area to accomplish the needed modifications to correct the life safety and fire protection and detection corrections identified. The work is on going to accomplish the corrections needed At the Test Reactor Area (TRA). The work has been divided into 11 Phases as follows:

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1997	FY 1998	FY 1999	Outyears	Total
Project Cost						
Facility Cost						
Design	1,019	46	22	216	12	1,315
Construction	1,301	1,773	526	6,543	3,988	14,131
Total, Line Item TEC	2,320	1,819	548	6,759	4,000	15,446
Other Project Costs						
Conceptual design costs	350	0	0	0	0	350
NEPA documentation costs	11	11	17	12	2	53
Other project-related costs	302	221	411	259	280	1,473
Total Other Project Costs	663	232	428	271	282	1,876
Total, Project Cost (TPC)	2,983	2,051	976	7,030	4,282	17,322

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility operating costs	1	1
Annual Programmatic operating expenses directly related to the facility	10	10
Total related annual funding	11	11
Total operating costs *(operating from (2002 through FY 2006)*	55	55

99-E-200, Electrical Utility Upgrade, Idaho National Engineering and Environmental Laboratory, Idaho

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

Date construction ends is extended 1 1/4 years from 3rd Quarter FY2002 to 4th Quarter FY2003.

To maintain TEC of $6.7M, scope and construction costs are reduced from $4,328K to $4,043K (total change of $285K) to address escalation and extended project duration costs due to the funding profile changes.

Due to the extended schedule, operating funds to support the project have increased by $240K to $860K, increasing the TPC from $7,320K to $7,560K.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	3Q 2000	3Q 2000	4Q 2002	6,700	7,320
FY 2000 Budget Request *(Current Baseline Estimate)*	2Q 1999	3Q 2000	4Q 2000	4Q 2003	6,700	7,560

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	341	341	341
2000	166	166	166
Construction			
2000	1,264	1,264	318
2001	1,944	1,944	2,890
2002	2,311	2,311	2,311
2003	674	674	674

3. Project Description, Justification and Scope

The Test Reactor Area (TRA) was established in the early 1950's with the development of the Materials Test Reactor. Two other major test reactors followed. The electrical distribution system supplying power to these programs included 13.8kV and 2400 volt equipment. Over the past 40 years, the electrical distribution system has been modified many times to accommodate operating requirements of the users.

The TRA Electrical Utility Upgrade Project provides for the design, procurement, and construction activities to correct specific electrical deficiencies in the 13.8kV and 5kV class equipment at the TRA. The scope addresses:

a) Increased reliability by replacement of 30 to 40 year old switchgear, transformers and panelboards.
b) Modification of the standby power system and elimination of the redundant battery banks and associated equipment.
c) Consolidation and reconfiguration of the electrical distribution system to avoid safety hazards while considering provisions for future expansion.
d) Simplification of switchgear use by utilizing common voltages.) Reconfiguration to allow preparation for demolition of facilities.
e) Abatement of hazards, including electrical shock.

This project proposes to upgrade portions of the TRA electrical distribution system to address deterioration, configuration, load requirements, and standby power requirements. The upgrades will result in a reliable and maintainable electrical distribution system that meets the current and projected needs of tenant programs.

Since the 1950's, when electrical distribution equipment was first being installed at the TRA, numerous modifications to the system have been accomplished. These modifications, while providing immediate solutions to specific problems, did not always address optimum system operation. The cumulative effect of changes over time and the deterioration of the system with age has resulted in decreased reliability and maintainability. Changing user requirements have resulted in potential safety concerns such as overloading of equipment. This project addresses usage, configuration, and deterioration of the electrical system.

The project scope typically includes, but is not limited to replacement of selected switchgear and facility transformers, modifications to electrical services and panels, construction of underground ductbanks, replacement of power cables and control wiring, and modifications to instrumentation and control equipment.

The conceptual design has identified major items of scope, however, these identified items and additional deficiencies identified during studies and design efforts will be prioritized and completed under this project as funding allows.

The requested FY 2000 budget appropriation will be used to complete design activities and start construction activities.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design Costs (Design Drawings and Specifications)	387	387
Design Management Costs (0 01% of TEC)	8	8
Project Management Costs (0.9% of TEC)	58	58
Total, Design and Management Costs (6.8% of TEC)	453	453
Construction Phase		
Utilities	3,566	3,566
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	278	278
Construction management (7.0% of TEC)	469	469
Project management (11.0% of TEC)	710	710
Total, Construction Costs	3,844	3,844
Contingencies (18.3% of TEC)	1,224	1,224
Total, Line Item costs (TEC)	6,700	6,700

5. Method of Performance

The Department of Energy Idaho Operations Office (DOE-ID) shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE-ID project management shall be performed by the Construction Management Group in the Office of Program Execution. Safety, environmental, and other project support shall be furnished to the project on an as-needed basis by the DOE-ID matrix organization.

The design, project management, and construction management shall be performed under a negotiated contract with the operating contractor. Construction and procurement shall be accomplished by fixed price contracts awarded on the basis of competitive bidding. Inspection may be performed by another agent. Check-out of systems, and maintenance of the completed project shall be performed by the operating contractor.

The INEEL operating contractor Project Manager shall be responsible for the entire project: design, all construction activities at the INEEL site, construction subcontracting, direction of the activities of construction subcontractors, and performance and management of construction activities as required to complete the project in a timely, safe, and cost-effective manner.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost						
Facility Cost						
Design	0	341	166	0	0	507
Construction	0	0	318	2,890	2,985	6,193
Total, Line item TEC	0	341	484	2,890	2,985	6,700
Other project costs						
Conceptual design costs	94	0	0	0	0	94
NEPA documentation costs	4	0	0	0	0	4
Other project-related costs	84	23	111	118	426	762
Total other project costs	182	23	111	118	426	860
Total, Project Cost (TPC)	182	364	595	3,008	3,411	7,560

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Total related annual funding	0	0

Nuclear Energy Plant Optimization

Mission Supporting Goals and Objectives

The U.S. has entered a period of change and uncertainty in the electricity sector. With the deregulation of electricity production, many unprecedented issues are challenging utilities, regulators, and the Federal Government. New technologies are altering the fuel choices made by utility planners. Environmental laws are causing the closure of older fossil-fuel plants, and many U.S. nuclear plant owners are approaching a critical decision point as to whether their plants should be shutdown at or before their initial license period, or whether they should apply for a twenty-year extension on that license.

The DOE's Energy Information Administration (EIA) anticipates that, even with aggressive implementation of energy efficiency measures, U.S. electricity consumption will increase 1.4 percent each year through 2020 – the equivalent of building seven large 1000-megawatt power plants every year. During this same period, the EIA projects approximately 127,000 megawatts of existing electricity generating capacity will be retired because of age, competitive pressures, and as part of U.S. utility efforts to meet clear air standards. As a result, the EIA estimates the U.S. must build the equivalent of over 1,000 new fossil fuel generating plants by 2020 to meet growth in demand and offset plant retirements. Building these plants will require a huge economic investment in new baseload generating capacity during the next two decades, and when in operation, these plants will emit large quantities of air emissions.

Continued operation of existing nuclear plants through their original license term and a 20-year renewed license term would delay the need to build more baseload power plants. Existing U.S. nuclear power plants are a vital component of the U.S. energy diversity strategy. Nuclear power plants have operated safely and reliably in the U.S. for decades and are capable of doing so for many decades to come. These plants provide approximately 20 percent of all the electricity generated in the United States. They operate year-round, in all weather conditions without emitting air pollutants.

Environmental issues associated with the burning of fossil fuels, including global climate change, are increasing in importance. To reduce the greenhouse gas (GHG) emissions that contribute to this problem, a comprehensive strategy that combines increased energy efficiency with greater use of nuclear and renewable energy will be required.

Nuclear energy is the only proven large-scale power source that has unlimited potential to provide clean and reliable electricity into the next century. Nuclear power plants do not produce environmentally damaging emissions. As much as 90 percent of the carbon dioxide avoided by U.S. utilities over the last 25 years is attributable to nuclear energy. Continued operation of existing nuclear power plants avoids over 620 million tons of carbon dioxide annually. Nuclear energy's avoidance of greenhouse gas emissions and other pollutants, therefore, is necessary to help the U.S. meet its international commitments to address concerns for global warming.

Globally, nuclear energy is growing in importance as an energy source for expanding economies. U.S. nuclear technology is often the preferred option for countries seeking the best in safety, efficiency, and

economics. U.S. leadership in these markets has been of great strategic importance to the United States, because it provides this nation with a prime seat at the table with other countries as they explore and implement nuclear power technologies. This presence has enabled the U.S. to exercise great international leadership in areas such as nuclear safety, non-proliferation, trade, and the environment.

The U.S. is at a critical juncture with regard to the continued operation of its nuclear power plants. Licenses for U.S. nuclear power plants will begin to expire in large numbers in 2010; licenses for 13 plants representing some 11,700 MWe will expire in 2014 alone. Faced with regulatory, and economic uncertainties, some utilities already have exercised their option to close nuclear facilities well before their license expiration date. This trend has resulted in the premature closing of 6 reactors, a loss of approximately 4,000 megawatts of U.S. generating capacity, in the past four years. Unless reversed by critical near-term action, this trend is expected to continue and could potentially accelerate as the uncertainties of deregulation come into play.

The President's Committee of Advisors on Science and Technology (PCAST) Panel on Federal Energy R&D identified the critical role of nuclear power in its report of November 5, 1997. The Panel's report recommended that the Department work with its laboratories and industry to develop a program to address the problems that may prevent the continued operation of existing nuclear power plants.

Recognizing the broad national strategic interests served by nuclear power and consistent with the Comprehensive National Energy Strategy, the Department proposes a new Nuclear Energy Plant Optimization (NEPO) program starting in FY 2000 in response to the recommendations of PCAST. The Department, national laboratories, and the electric utility industry's Electric Power Research Institute (EPRI) developed the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. This report, issued March 20,1998, utilized input from the national laboratories, NRC, and other key stakeholders. The purpose of this Strategic Plan, which will be updated in FY 1999, is to help the federal government and private sector jointly identify, prioritize, and execute the essential peer-reviewed R&D needed over the next 10 to 12 years to sustain operation of existing nuclear power plants, based on strategic national goals that both industry and government endorse. The work performed in this program will be prioritized by the Nuclear Energy Research Advisory Committee (NERAC) Subcommittee on Operating Nuclear Power Plant Research, Coordination and Planning. NERAC will also guide the application of peer review and the competitive selection of performers.

The goal of the NEPO program is to ensure that current nuclear plants can continue to deliver adequate and affordable energy supplies up to and beyond their initial 40-year license period by resolving open issues related to plant aging, and by applying new technologies to improve plant economics, reliability, and availability.

The objectives related to this goal are:

- Managing long-term effects of component aging: Component and structure material degradation occurs in nuclear plants as a result of long-term operation and exposure of materials to harsh environmental conditions. R&D conducted under NEPO will provide a better understanding of degradation mechanisms and how they occur, enabling development of cost-effective aging management strategies which will provide capabilities to easily prevent, detect or repair the degradation.

- Improving nuclear power plant capacity factors: This objective focuses on improving the long-term economic performance of current plants through development of technologies that will improve equipment reliability, lower operating costs, and increase power output while maintaining high levels of safety.

- Generation optimization through efficiency and productivity improvements: Current nuclear plants were designed and are operating with technology developed over twenty-five years ago. As these nuclear plants age, components and parts degrade or become obsolete, introducing inefficiencies, added costs, and unreliability. There have been significant technology advancements over the past twenty-five years that are applicable to power generation, particularly in computers, communications, materials, sensors and digital electronics, and artificial intelligence, providing more accurate, reliable and cost-effective technologies. Further research and technology developments will produce new technology applications that will make nuclear plant operation and maintenance processes more economical and increase overall plant output. Demonstrations of technology performance will be an integral part of this R&D effort in order to achieve regulatory acceptance of these new technologies.

The R&D performed by the nuclear industry - totaling approximately $100 million each year - is critical to the maintenance of safe and economic operation of U.S. nuclear power plants. However, the nuclear industry's primary interest is to invest the bulk of its R&D spending on short-term payback, low-risk activities that are needed to enhance day-to-day operational performance and safety. DOE's role in nuclear energy R&D is the same as in other areas of DOE energy research: to address the difficult technology issues that it is better equipped to solve than industry--because of the unique facilities and capabilities available to DOE, the lack of market incentive for industry to develop technologies important to the national interest, or because of the long-term and/or high-risk nature of the research.

The Department and the Nuclear Regulatory Commission (NRC) have established close coordination in research program planning to assure that the work performed by each organization is complementary to the other, cost-effective, and without duplication. The role of the NRC is very different from that of DOE. DOE's role is to develop technologies to address operational issues at nuclear power plants. NRC's role is to assure that it can provide the public with independent assurance that the technologies developed by DOE or industry for use in nuclear power plants are safe. NRC conducts confirmatory research as part of its responsibility to develop rules or regulations for use of new technology in nuclear

power plants. Although DOE's proposed R&D includes areas in which NRC has ongoing programs, the focuses of the two programs are distinct. Finally, to assure that NRC and DOE remain fully coordinated in all aspects of their research programs, the Department has invited the NRC to select a high-level representative to serve as an ex-officio member of the NERAC.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nuclear Energy Plant Optimization	0	0	5,000	+ 5,000	+100.0%
Total, Nuclear Energy Plant Optimization ...	0	0	5,000	+ 5,000	+100.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Nuclear Energy Plant Optimization			
■ NEPO is proposed as a new program to address problems that will likely prevent the continued operation of many existing nuclear power plants. Funds provided by DOE will be matched by industry in conducting the proposed peer-reviewed R&D to include: managing long-term effects of component aging; improving nuclear power plant capacity factors; and generation optimization through efficiency and productivity improvements.	0	0	5,000
Total, Nuclear Energy Plant Optimization	0	0	5,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Nuclear Energy Plant Optimization	
■ The NEPO Program is a new program for FY 2000 to conduct innovative nuclear energy R&D as recommended by the PCAST Panel on Federal Energy Research and development. Matching funds are to be provided by industry. The activities funded under NEPO will be based on the critical R&D needs defined in the Joint DOE-EPRI Strategic R&D Plan to Optimize U.S. Nuclear Power Plants	+ 5,000
Total Funding Change, Nuclear Energy Plant Optimization	+ 5,000

Nuclear Energy Research Initiative

Mission Supporting Goals and Objectives

The Nuclear Energy Research Initiative (NERI) involves the research and development of new technologies to address the key issues affecting the future of nuclear energy, in particular, proliferation resistant reactors and fuel cycles; new reactor designs with higher efficiency, lower cost, and improved safety to compete in the global market; low output reactors; and new techniques for on-site and surface storage and permanent disposal of nuclear waste. [a]

A primary mission of the Department of Energy is to help assure that the United States maintains a flexible and diverse portfolio of energy supply options to power economic growth and enhance the quality of life for the American people. Nuclear energy currently provides about 20 percent of U.S. electricity generation and can contribute a significant portion of U.S. electrical energy production for many years to come. As we now enter a new millennium, the Nation faces new issues associated with energy supply and environmental policy. The potential role of nuclear power to address these new challenges, such as global climate change, will depend upon the ability of the Federal government, universities, national laboratories, industry, and others to pool their talents and creatively address the key challenges affecting the future of nuclear energy. This was clearly articulated in the President's Committee of Advisors on Science and Technology (PCAST) Panel's November 5, 1997, report to the President on Federal Energy Research and Development.

The United States has always been the world leader in both the policy and technical aspects of nuclear energy. The United States has more nuclear power plants in operation today than any other nation and most of the world's operating nuclear power plants are based on U.S. light water reactor technology. U.S. nuclear power plant technology has been exported and adapted for use in France, Japan, South Korea, and many other countries. Many countries, particularly the fast-growing economies in Asia, are interested in building new plants based on U.S. designs. Given the projected growth in global energy demand as developing nations industrialize; our vital strategic interests in addressing global climate change, nuclear non-proliferation, nuclear safety, and economic competitiveness; and our need to satisfy growing domestic needs for energy in an environmentally responsible manner, the United States must maintain its scientific and technological leadership in nuclear energy. This leadership provides the U.S. a "seat at the table" when it comes to negotiation of policy issues related to non-proliferation and related topics.

While nuclear power presents significant environmental and other benefits, several important issues impede nuclear energy's future--among these are issues related to the disposal of nuclear waste; international concerns about nuclear materials proliferation; public concerns about safety, and nuclear power's problematic economic record in the United States. Industry and government share in the

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[a] As noted in the "Federal Energy Research And Development For The Challenges Of The Twenty-First Century" Report of the Energy Research and Development Panel, The President's Committee of Advisors on Science and Technology (PCAST), November 1997

responsibility for these problems and it is in the long-term strategic interests of the Nation that they be addressed and resolved. In particular, because no new nuclear power plants are expected to be built in this country for at least another decade, it is important that the government take appropriate action both to address key issues and to maintain a viable technology infrastructure in the United States. To date, current trends in industry, government, and universities are in contrast with the vital strategic needs of the Nation:

- Because of the lack of near-term economic incentives to conduct long-term research, U.S. industry's support of advanced nuclear research continues to shrink;
- University nuclear engineering and research programs face severe challenges and reduced funding, paralleling the reduced outlook for nuclear energy-related jobs in industry; and
- The role of the Federal Government in nuclear energy research has already changed--the funding for the Department's nuclear energy research activities has been sharply reduced in recent years.

Recognizing the important national need to address these issues, the PCAST Panel on Federal Energy Research and Development determined that establishing nuclear energy as a viable and expandable option was important, and recommended that the Department establish a new nuclear energy research program to address the problems of nuclear waste, proliferation, safety and economics. Specifically, the PCAST panel recommended the Department initiate a new nuclear energy research initiative based on competitive selection of research proposals from the national laboratories, universities and industry to "address the key issues affecting the future of fission energy including: proliferation-resistant reactors or fuel cycles; new reactor designs with higher efficiency, lower-cost, and improved safety to compete in the global market; lower output reactors for use where large reactors are not attractive; and new techniques for on-site and surface storage and for permanent disposal of nuclear waste.".

The Department endorsed this recommendation and proposed the creation of the NERI in FY 1999. To achieve this goal, the following objectives have been established for NERI:

- Develop advanced concepts and scientific breakthroughs in nuclear fission and reactor technology to address and overcome the principal technical and scientific obstacles to the expanded use of nuclear energy in the U.S. including issues involving nuclear proliferation, unfavorable economics, and nuclear waste disposition;
- Advance the state of nuclear technology to maintain a competitive position in overseas markets and a future domestic market;
- Promote and maintain a nuclear science and engineering infrastructure to meet future technical challenges; and
- Improve performance, efficiency, reliability, and economics to enhance nuclear energy application.

NERI will feature a competitive, investigator-initiated, peer-reviewed selection process to fund innovative nuclear energy-related research at universities, national laboratories, and industry. The Department believes that by funding creative research ideas at the Nation's science and technology institutions and companies, the United States will find new solutions to issues such as nuclear safety, power plant economics, proliferation, and nuclear waste. NERI program funding will be utilized to fund both the research and development activities and the independent merit review (peer review) to evaluate the scientific and technical merit of the proposals submitted.

Scientific and engineering research requested in the FY 1999 program solicitation reflects stakeholder input from universities, national laboratories, and industry resulting from a major workshop with over 126 participants held in Washington, D.C. on April 22-23, 1998. In addition, the Office of Nuclear Energy, Science and Technology works closely with the Office of Science in both the implementation of NERI and peer review to ensure that the program is implemented consistent with recommendations of PCAST, and peer reviewed consistent with the Office of Science process.

This research initiative will be managed by the Department's Office of Nuclear Energy, Science and Technology with external oversight provided on a periodic basis by the Nuclear Energy Research Advisory Committee (NERAC) to guide the strategic focus of research. The Department will continue to encourage joint research and development activities among universities, national laboratories, and industry; as well as the involvement of foreign research organizations. The Department will solicit proposals from the scientific and technical community for research that is relevant to addressing the vital issues facing nuclear energy. NERI will include an independent peer review process to evaluate and select specific research proposals to ensure the scientific and technical merit and relevancy of the research. NERI activities will continue to be coordinated with other relevant DOE program offices to assure that the best use is made of the Department's financial, intellectual, and physical resources.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nuclear Energy Research Initiative *	0	19,000	25,000	+6,000	+31.6%
Total, Nuclear Energy Research Initiative ...	0	19,000	25,000	+6,000	+31.6%

* NERI is a new program in FY 1999 that is in the solicitation phase as this document is being prepared; therefore the research activities cannot be specified.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Nuclear Energy Research Initiative			
■ Continue the NERI program which was initiated in FY 1999 to stimulate innovative research to address the difficult issues that compromise nuclear energy's potential as a viable and expandable future electricity option. DOE proposed the NERI program to encourage innovation and foster new ideas from our nation's leading researchers at universities, national laboratories and industry to address the issues of proliferation, nuclear waste, reactor safety and nuclear plant economics. Resolution of these issues through a successful NERI program will help to make nuclear energy a viable electricity option for the next century. Given the projected growth in global energy demand as developing nations industrialize, and the desire to reduce regional and global air pollution, it is vitally important to achieve this objective. The FY 1999 NERI solicitation requested research proposals with periods of performance up to 3 years, the first year to be funded with FY 1999 appropriations and the second year with FY 2000 appropriations. Hence, a substantial portion of the requested $25 million will be used to continue research proposals awarded in FY 1999. Approximately $6 million will be available for new research proposals under a FY 2000 solicitation.	0	19,000	25,000
Total, Nuclear Energy Research Initiative	0	19,000	25,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Nuclear Energy Research Initiative	
■ Continue in FY 2000 the nuclear energy research programs initiated in FY 1999 and make available approximately $6 million for new research	+6,000
Total Funding Change, Nuclear Energy Research Initiative	+ 6,000

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	2,929	2,540	2,250	-290	-11.4%
General Plant Projects	2,796	1,990	1,110	-880	-44.2%
Total, Capital Operating Expenses	5,725	4,530	3,360	-1,170	-25.8%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998 Request	FY 1999 Approp.	FY 2000 Approp.	Unapprop. Balance
95-E-20, TRA Fire and Life Safety Improvements, INEEL	15,446	4,596	4,425	2,425	1,500	2,500
99-E-200, TRA Electrical Utility Upgrade	6,700	0	0	341	1,430	4,929
Total, Construction		4,596	4,425	2,766	2,930	7,429

Termination Costs

Program Mission

The Termination Costs Program is a key component of the Department's energy supply and research missions and is directed at:

- Ensuring the cost-effective, environmentally-compliant operation of Office of Nuclear Energy, Science and Technology (NE) sites and facilities;
- Maintaining the physical and technical infrastructure necessary to support research and technology development by U.S. and overseas researchers;
- Demonstrating the acceptability of electrometallurgical technology for preparing DOE spent nuclear fuel for ultimate disposal; and
- Placing unneeded facilities in industrially safe and environmentally compliant conditions for low-cost, long-term surveillance.

Termination Costs supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

- *Environmental Quality Objective 6* - Reduce life-cycle costs of environmental cleanup.

  - FY 2000 Strategy - The Department will reduce operating costs by continuing deactivation of surplus nuclear facilities and placing them in a radiologically and industrially safe shutdown condition. The Department will also demonstrate the viability of electrometallurgical technology for application to DOE spent nuclear fuel management needs.

Program Goal

- To contribute to the nation's nuclear science and technology infrastructure through the development of innovative technologies for spent fuel storage and disposal and the effective management of active and surplus nuclear research facilities.

Program Objectives

- Demonstrate the viability of electrometallurgical technology and the resulting waste forms for application to DOE spent nuclear fuel management needs, including the preparation of EBR-II and other DOE sodium-bonded spent nuclear fuel for disposition in a geological repository. *(Program Objective 1)*
- Place the EBR-II and other surplus facilities at the Argonne National Laboratory-West (ANL-West) site near Idaho Falls, Idaho in a radiologically and industrially safe shutdown condition for low-cost, long-term surveillance and maintenance. *(Program Objective 2)*

- Maintain ANL-West site safety, security, and safeguards infrastructure and ensure all nuclear materials are secure and handled safely in a manner which protects workers, the public, and the environment. *(Program Objective 3)*

- Maintain the ANL-West site waste management and technology development support needed to meet the Department's commitments to the State of Idaho. *(Program Objective 4)*

Performance Measures

- Complete the demonstration of the electrometallurgical spent fuel treatment technology by the end of FY 1999 using Experimental Breeder Reactor-II spent nuclear fuel. *(Performance Measure supports Program Objective 1)*

- Complete the conversion and disposition of 100 percent of the secondary sodium coolant from the Experimental Breeder Reactor-II and 40 percent of the Fermi reactor sodium coolant in storage at Argonne National Laboratory-West. *(Performance Measure supports Program Objective 2)*

- Determine by September 1999 whether electrometallurgical waste forms perform better than borosilicate glass under conditions consistent with the requirements being developed for the Department's geological repository license application. *(Performance Measure supports Program Objective 1)*

- In FY 2000, complete the draining and processing of EBR-II primary sodium. *(Performance Measure supports Program Objective 2)*

- In FY 2000, complete a National Environmental Policy Act review on the use of electrometallurgical technology to treat EBR-II and other sodium-bonded fuel in the Department's spent fuel inventory. *(Performance Measure supports Program Objective 4)*

- In FY 2000, complete documentation of the operational phase of the demonstration project and resulting data from the electrometallurgical technology demonstration. *(Performance Measure supports Program Objective 1)*

- Develop technical basis to support a DOE decision in FY 2000 on future application of the electrometallurgical treatment technology in the disposition of DOE spent nuclear fuels. *(Performance Measure supports Program Objective 4)*

- In FY 2000, develop preliminary cost estimates and schedules for deactivating the Fuel Conditioning Facility and the Sodium Processing Facility. *(Performance Measure supports Program Objective 2)*

Significant Accomplishments And Program Shifts

- Demonstration of the electrometallurgical technology for treatment of sodium-bonded EBR-II fuel and blanket assemblies was initiated in June 1996.
- EBR-II defueling was completed in December 1996.
- In FY 1997, an Environmental Assessment and Finding of No Significant Impact were issued for the shutdown of the EBR-II, including the conversion of the sodium coolant to an environmentally acceptable form suitable for disposal.
- In FY 1998, modifications to the Sodium Process Facility were completed to enable processing of legacy Fermi reactor sodium and EBR-II sodium into a waste form suitable for disposal.
- In FY 1999, complete the draining and processing of the 17,000 gallons of sodium coolant from the EBR-II secondary heat transport system.
- In FY 1999, complete the operational phase of the electrometallurgical treatment technology demonstration project.
- In FY 2000, complete a National Environmental Policy Act review and issue a Department decision on the use of the electrometallurgical technology to treat the remaining inventory of EBR-II spent fuel and other DOE sodium-bonded spent fuel.
- In FY 2000, complete all sodium coolant processing at ANL-West.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Termination Costs					
Termination Costs	88,149 [a]	85,000	0	85,000	65,000
Total, Termination Costs	88,149 [a]	85,000	0	85,000	65,000

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory	87,135	85,000	65,000	-20,000	-23.5%
Chicago Operations Office	158	0	0	0	0.0%
Total, Chicago Operations Office	87,293	85,000	65,000	-20,000	-23.5%
Oakland Operations Office	120	0	0	0	0.0%
Oak Ridge Operations Office	20	0	0	0	0.0%
All Other Sites	716	0	0	0	0.0%
Total, Termination Costs	88,149 [a]	85,000	65,000	-20,000	-23.5%

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) is one of the U.S. Department of Energy's largest research centers. It is also the nation's first national laboratory, chartered in 1946. Argonne National Laboratory is located at two sites. The Illinois site, ANL-East, is the main laboratory and occupies 1500 acres, surrounded by a forest preserve about 25 miles southwest of Chicago's Loop. The Idaho site, ANL-West, occupies about 900 acres on the Idaho National Engineering & Environmental Laboratory site, about 35 miles west of Idaho Falls in Southeastern Idaho's Snake River Valley.

Typically, basic research is conducted at the ANL-East laboratory near Chicago, with large-scale testing and development conducted at the Idaho site, ANL-West. For example, experiments, modeling and analyses at ANL-East developed the electrometallurgical technology that is now being demonstrated with spent nuclear fuel at ANL-West. The capabilities of ANL-West also include nuclear fuel development, post-irradiation examinations, waste and nuclear material characterization, and development of dry, interim storage for spent fuel and other materials.

Activities under the Termination Costs program use a number of significant facilities at ANL-West, including the Hot Fuels Examination Facility (HFEF), Fuel Conditioning Facility (FCF), Fuel Manufacturing Facility (FMF), Sodium Process Facility (SPF), and Radioactive Scrap and Waste Facility (RSWF).

The HFEF is a versatile modern hot cell facility that is operated to characterize and package spent fuel and radioactive waste, including high-level waste which could ultimately be placed in a geologic repository. The FCF is being used to demonstrate the electrometallurgical treatment technology on spent fuel removed from the Experimental Breeder Reactor-II (EBR-II), a research reactor at ANL-West that is

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

being deactivated. The FMF is currently being used to develop and test fuel for research reactors, and to verify suitability of waste forms that would result from electrometallurgical treatment. The SPF is being used to convert the legacy sodium from the Fermi reactor in Michigan which is stored at ANL-West and the sodium coolant from EBR-II into a chemically stable, low-level waste form. The RSWF provides a fully permitted interim storage capability for a wide variety of experimental spent fuels and radioactive scrap. Other facilities at ANL-West, such as the Zero Power Physics Reactor and the Transient Reactor Test Facility, while not currently operating, provide a number of reactor physics, core design, nuclear materials, and waste treatment testing capabilities.

Termination Costs

Mission Supporting Goals and Objectives

Activities at ANL have four principal goals that support accomplishment of the overall mission of the Termination Costs program. These are:

- Deactivate unneeded facilities, including the EBR-II, and secure them in a radiologically and industrially safe shutdown condition for low-cost, long-term surveillance and maintenance.
- Ensure that the site is maintained in a safe and environmentally compliant manner, that Departmental assets are available as needed to support national objectives, and that all nuclear materials are appropriately stored and safeguarded.
- Conduct advanced research and development in the area of the treatment of DOE spent nuclear fuels using electrometallurgical methods. (formerly Nuclear Technology R&D)
- Complete analysis of the data resulting from the electrometallurgical technology demonstration project, support the National Environmental Policy Act review of electrometallurgical technology for spent fuel disposition, and implement the resulting Record of Decision.

In addition to deactivation activities, Termination Costs program includes activities formerly funded under the Nuclear Technology R&D Program. These activities support the Department's mission to manage approximately 2,700 metric tons of spent nuclear fuel currently in its inventory. These activities could reduce life-cycle costs by developing and deploying an innovative spent fuel treatment technology to solve currently intractable problems. Efforts in this area are important to the Department's strategic environmental quality goal to aggressively address the legacy of civilian nuclear research and development programs, minimize waste volumes, safely manage nuclear materials, and permanently dispose of the Department's radioactive wastes.

The challenge of effectively managing the large inventory of DOE spent nuclear fuel is greatly complicated by the fact that it consists of about 150 different fuel types. Some of these spent fuels present special problems, (*e.g.*, the presence of hazardous materials such as sodium). Other spent fuels are damaged, such as the core debris from Three Mile Island unit 2. Spent fuel with these characteristics may not be acceptable for disposal in current form in a geologic repository and therefore must be treated. A prime example of this type of challenge is the EBR-II spent fuel at the ANL-West site. The EBR-II spent fuel is a metal fuel form containing elemental sodium as a bonding agent. Sodium metal is highly reactive; it burns in air and can explode when exposed to water. Because the sodium is partially absorbed by the uranium fuel elements, mechanical means are not fully effective in removing sodium. Therefore, the Department plans to treat this fuel to create a waste form acceptable for disposal. Currently, the only treatment process that the Department has found that can adequately remove the sodium from EBR-II spent fuel is the electrometallurgical treatment technology developed by ANL. In FY 1996, the Department completed an environmental assessment for the demonstration of electrometallurgical technology to treat EBR-II fuel and blanket assemblies. This demonstration project,

limited to 125 EBR-II driver and blanket assemblies, is being conducted at ANL-West and is scheduled for completion in FY 1999.

Under the Nuclear Technology R&D program, ANL-East conducted electrometallurgical treatment R&D to support the timely completion and accurate assessment of the EBR-II spent fuel treatment demonstration project at ANL-West. In addition to direct analytical support to demonstration operations, limited R&D efforts were directed at increasing the understanding and managing the remaining technical challenges of applying the electrometallurgical technology to spent nuclear fuel. Waste form fabrication and performance results from the demonstration project will be used by the Department in evaluating this technology for application to other DOE-owned spent fuel. The electrometallurgical treatment technology is not being developed to address commercial spent fuel.

A National Academy of Sciences (NAS) panel, working through the National Research Council, has been providing an ongoing independent evaluation of the development of electrometallurgical technology and the demonstration project. Based on their reviews, the Academy supports completion of the electrometallurgical technology demonstration project and the subsequent analysis of the laboratory results. The NAS is currently scheduled to issue a final report on the electrometallurgical technology in December 1999. The NAS review is crucial to the Department's assessment of the demonstration project and any decision to proceed with further application of electrometallurgical technology to the remaining inventory of EBR-II spent fuel and other sodium-bonded fuel.

The FY 2000 budget request provides funding to develop and test waste stream treatment process equipment of a scale suitable for spent fuel inventory treatment, conduct long-term tests to characterize performance of reference waste forms in accordance with established testing protocol, and develop waste form qualification plans and modeling which can be used to gain Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository.

After completion of the operational phase of the electrometallurgical demonstration project, the Department will evaluate the suitability of the technology for full-scale treatment of the remaining inventory of EBR-II spent fuel. The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. Thus, the FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
ANL-West Infrastructure	39,114	37,000	36,000	-1,000	-2.7%
Facility Termination Activities	49,035	48,000	19,000	-29,000	-60.4%
Technology Activities	0	0	10,000	+10,000	+100.0%
Total, Termination Costs	88,149 [a]	85,000	65,000	-20,000	-23.5%

[a] Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
ANL-West Infrastructure			
■ Site facility and utility maintenance for water, electricity, steam, fire protection, and communications	13,600	13,300	13,200
■ Radiation protection, environmental compliance, and industrial safety	6,000	5,900	5,400
■ Site utilities and facility systems engineering and technical support	6,000	5,900	5,700
■ Services and administration costs for human resources, procurement, office support, and warehousing	8,814	7,400	7,050
■ Security investigations for obtaining and maintaining security clearances	0	0	150
■ Safeguards and security for site and storage of spent fuel and special nuclear materials	4,700	4,500	4,500
Total, ANL-West Infrastructure	39,114	37,000	36,000
Facility Termination Activities			
■ Electrometallurgical technology R&D for non-sodium bonded fuel	3,035	0	0
■ Electrometallurgical demonstration project and sodium-bonded fuel treatment R&D	40,000	40,000	0
■ Sodium processing of EBR-II and Fermi sodium	4,000	5,600	3,400
■ EBR-II shutdown and deactivation activities	2,000	2,400	4,200
■ Maintain FCF to allow for continuation of electrometallurgical treatment of remaining EBR-II fuel or deactivation of FCF (contingent on NEPA review)	0	0	10,700
■ Repackage and remove DOE legacy spent nuclear fuel from a fuel development program from Babcock & Wilcox	0	0	700
Total, Facility Termination Activities	49,035	48,000	19,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Technology Activities			
■ Develop and test waste stream treatment process equipment of a scale suitable for spent fuel inventory treatment. Conduct long-term tests to characterize performance of reference waste forms in accordance with established testing protocol, and develop waste form qualification plans and modeling which can be used to gain Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository	0	0	10,000
Total, Termination Costs	88,149 *	85,000	65,000

* Includes $12 million appropriated for Nuclear Technology R&D under Other Defense Activities.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
ANL-West Infrastructure	
■ The slight reduction in infrastructure costs reflects a renewed effort on the part of the Department and the Laboratory to minimize overhead costs	-1,000
Facilities Termination Activities	
■ The Department's decision to proceed with electrometallurgical processing will be based, in part, on the results from the National Academy of Sciences' review, as well as the completion of an Environmental Impact Statement. The FY 2000 budget request provides limited funding for the application of electrometallurgical technology since full-scale processing of EBR-II spent fuel will not commence immediately after completion of the demonstration project.	-29,000
Technology Activities	
■ The increase in the technology activities reflects a transition from research in spent fuel treatment technologies to the development and testing of process equipment on a scale suitable for implementation in a spent fuel treatment project. In addition, long-term tests to characterize performance of reference waste forms in accordance with established testing protocol will be conducted, and waste form qualification plans and computer modeling for used in obtaining Nuclear Regulatory Commission approval for emplacement of metal and ceramic waste forms in a geologic repository will be developed	+10,000
Total Funding Change, Termination Costs	-20,000

Fast Flux Test Facility

Program Mission

The Fast Flux Test Facility (FFTF) program provides for the safe and cost-effective maintenance of the FFTF. The FFTF was placed on standby in 1993 after the Department determined that it had sufficient research reactor capabilities to carry out its missions. However, since that time, the Department has terminated one major research reactor project and shutdown three of its operating research reactors. As a result, the Department is considering whether to propose the operation of the FFTF to meet various national isotope production and research needs. The Secretary has indicated that a decision will be made during the Spring of 1999 as to whether to initiate an Environmental Impact Statement to analyze the potential restart of the FFTF, or to proceed with the facility's permanent deactivation.

The Fast Flux Test Facility program supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

- *Environmental Quality Objective 6* - Reduce life-cycle costs of environmental cleanup.

  - FY 2000 Strategy - The Department will reduce operating costs by continuing deactivation of surplus nuclear facilities and placing them in a radiologically and industrially safe shutdown condition. At the requested budget level, some plant systems required for operation would be permitted to fail.

Program Goal

- To support implementation of the Secretary's anticipated Spring of 1999 decision regarding future operation of FFTF. The Department is considering whether FFTF, which is located at the Hanford site near Richland, Washington, should be used for the future production of medical and industrial radioisotopes and other nuclear research and irradiation activities. If the Department decides that FFTF is not needed for any future mission, the facility will be permanently deactivated.

Program Objective

- To maintain FFTF and the adjacent Fuels and Materials Examination Facility (FMEF) in a safe standby condition pending an April 1999 decision by the Secretary of Energy to: restart the facilities for medical isotope production, nuclear research, and other irradiation purposes; resume deactivation of the facilities; or maintain the facilities in standby for potential future use.

Performance Measures

- Maintain the Fast Flux Test Facility in a safe, environmentally-compliant standby condition to permit implementation of an anticipated Secretarial decision in FY 1999 to deactivate or pursue potential restart to support a range of national research reactor requirements.

- In FY 2000, meet all Federal and State safety and environmental requirements for the Fast Flux Test Facility while implementing a Secretarial decision on the Facility.

Significant Accomplishments And Program Shifts

- In FY 1997, completed the construction of a RCRA-compliant Sodium Storage Facility to safely store the sodium coolant from FFTF primary and secondary heat transport systems.

- In FY 1997, a Secretarial decision was made to maintain FFTF in standby condition and to evaluate the tritium and medical isotope production capabilities of the facility.

- In December 1998, a Secretarial decision was made to not use FFTF for tritium production and to make a decision on any future missions for the facility by April 1999.

  - In the Spring of 1999, the Department will decide whether to terminate the FFTF or restart it to support a range of national research reactor requirements. The FY 2000 request would fund minimum surveillance and maintenance of the FFTF to keep it in a safe and environmentally-compliant condition. The FY 2000 request is adequate to support minimum surveillance and maintenance of the facility, however funding above the FY 2000 request level would be required to restart, permanently shutdown, or maintain the facility in its current condition.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Fast Flux Test Facility (FFTF)					
Fast Flux Test Facility (FFTF)	0 [a]	30,000 [b]	0	30,000	30,000
Total, Fast Flux Test Facility Program ...	0 [a]	30,000 [b]	0	30,000	30,000

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland Operations Office					
Fluor Daniel Hanford	0 [a]	30,000 [b]	30,000	0	0.0%
Total, Fast Flux Test Facility	0 [a]	30,000 [b]	30,000	0	0.0%

Site Description

Hanford Site

The FFTF, located at the Department's Hanford Site, near Richland, Washington, is a U.S. Government-owned 400 megawatt-thermal sodium-cooled, fast-neutron flux reactor originally intended for irradiation testing of nuclear reactor fuels and materials for the U.S. liquid metal reactor (LMR) program. The FFTF is the largest and most modern facility of its kind in the world.

The design, operation, and maintenance of FFTF was conducted in accordance with the standards established by the Office of Reactor Development and Technology (RDT) and the American National Standards Institute (ANSI), and the codes established by the American Society of Mechanical Engineers (ASME). An independent safety review of the design and construction of FFTF was conducted by the U.S. Nuclear Regulatory Commission (NRC) at the request of the Energy Research and Development Administration. The objective of the safety review was "to provide an in-depth technical review of the design of the FFTF comparable to that of a licensed plant." The NRC safety review was directed at "evaluating the adequacy of the design to ensure safe operation of the plant" and resulted in the issuance of a Safety Evaluation Report in August 1978.

The FFTF is an array of buildings and equipment arranged around a reactor containment building. The reactor vessel is located in a shielded cell in the center of the containment. Heat is removed from the reactor vessel by liquid sodium circulated through three primary loops (including primary pumps, piping and intermediate heat exchangers) also located in cells in containment. Secondary sodium coolant loops transport the reactor heat from the intermediate heat exchangers to the air-cooled tubes of the dump heat exchangers.

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[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

The FFTF includes facilities for receiving, conditioning, storing, installing and removing from the core all routinely replaced core components, and storing irradiated fuel. Post-irradiation examination and packaging capabilities are also available. Utilities and services at FFTF include onsite emergency generation of electrical power, heating and ventilation, radiation monitoring, fire protection, auxiliary cooling systems for cell atmospheres and some components.

The FFTF is in standby with the reactor completely defueled. The main heat transport system is being operated at approximately 400°F. Essential systems, staffing, and support services are being maintained. Standby surveillance and maintenance activities are being performed to ensure that there is: (1) no degradation of key plant systems; (2) retention of the authorization basis and configuration control; (3) maintenance of key staffing, qualifications, and training; and (4) full compliance with Federal and state safety and environmental requirements.

The FFTF was operated from April 1982 to April 1992 in support of various Department programs such as material testing for fusion, space reactor, and international fast reactor programs. The facility played a key role in LMR development and testing activities as it provided a test bed for demonstrating and evaluating the performance of fuel assembly and core designs in a prototypic LMR environment. The FFTF is widely considered the Department's best nuclear facility in terms of conduct of operations.

The FFTF has been in a hot-standby condition since December 1993. In November 1995, the Department decided to limit deactivation work at FFTF to those activities which would not prohibit the facility from being returned to service in order to study the facility's capability for tritium and medical isotope production. In January 1997, the Department decided to continue to maintain the facility in standby to further evaluate the tritium and medical isotope production capabilities of the facility and to determine what role, if any, the facility could play in the Department's tritium production strategy.

In December 1998, the Secretary announced his decision not to use FFTF for tritium production and to decide in the Spring of 1999 whether the facility would be used to support any other missions. The Secretary has tasked the Department's Nuclear Energy Research Advisory Committee to complete its review of the nation's nuclear science and technology infrastructure in time to inform the Spring 1999 decision. Potential future missions for FFTF include medical isotope production, advanced materials research, plutonium-238 production, and nuclear energy research and development.

The requested funding level supports minimum surveillance of the FFTF while it remains on standby. However, the requested funding level will permit some plant systems required for operation to fail.

Fast Flux Test Facility

Mission Supporting Goals and Objectives

The FFTF is a multi-use facility capable of supporting the Department's strategic missions of energy resources, science and technology, and national security. The FY 2000 budget request is based on performing activities which are required to maintain the facility in a safe and environmentally-compliant condition. The FY 2000 request would allow some key plant components required for operations to fail.

Additional funding would be required to restart, deactivate, or maintain the FFTF in its current condition.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Fast Flux Test Facility (FFTF)	0 [a]	30,000 [b]	30,000	0	0.0%
Total, Fast Flux Test Facility	0 [a]	30,000 [b]	30,000	0	0.0%

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Fast Flux Test Facility			
■ Continue FFTF standby activities, such as continuing to maintain FFTF systems in compliance with Federal and State regulations and permit requirements	0	30,000	30,000
Total, Fast Flux Test Facility	0[a]	30,000[b]	30,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Fast Flux Test Facility	
■ The FY 2000 funding request would provide funding for minimum surveillance and maintenance of the FFTF to keep it in a safe condition and in compliance with Federal and State environmental regulations. At the requested funding level, some plant systems necessary for operation would be permitted to fail.	0
Total Funding Change, Fast Flux Test Facility	0

[a] $41.7 million included in the Nuclear Materials and Facilities Stabilization budget for the Office of Environmental Management. $9.2 million of this was reprogrammed from Uranium Programs for deactivation activities at FFTF in FY 1999.

[b] Excludes $9.2 million of prior year balances reprogrammed into this account in FY 1998.

Isotope Support

Program Mission

The mission of the Isotope Program is to serve the national need for a reliable supply of isotope products, services and related technology used in medicine, industry, and research. The program supports development of new or improved isotope products and services that are used in medical diagnoses and therapy, and other applications that are in the national interest. Prices charged for these products and services may not always achieve full-cost recovery to the Government. The Department encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production of a given isotope becomes well established, DOE will no longer supply that isotope.

All appropriations for the Isotope Support decision unit fund a payment into the Isotope Production and Distribution Fund as required by P.L. 101-101 and as modified by P.L. 103-316. Requested funding is required to maintain financial continuity of radioactive and stable isotope research, development, production, processing, distribution, and associated services to commercial and research customers. Funding will also be used to provide radioisotopes and enriched stable isotopes for research and development, medical diagnosis and therapy, isotopes applications, to support nuclear medicine research, and to support administrative activities.

By August 1999, the Department will complete the modification of facilities at Sandia National Laboratories, New Mexico, required to support molybdenum-99 (Mo-99) production sufficient to meet 100 percent of U.S. demand. The revision of all safety documentation and operational procedures for the facilities, started in fiscal year 1998, and will be completed in fiscal year 1999. The Department's capital investment in the Mo-99 project will thus be completed in fiscal year 1999 and the goal of achieving a backup supply of Mo-99 will have been met. Mo-99 is the most widely used isotope. Isotopes are used in over 40,000 medical procedures per day in the U.S. to diagnose maladies, such as cancer and heart disease. The Mo-99 project will be at a point that 1) production of Mo-99 can be mobilized on an emergency basis if the foreign supply of Mo-99 is significantly disrupted, and 2) the Sandia facilities are ready for the private sector to make further investments to take the project to routine commercial production.

The fiscal year 2000 budget request for Isotope Support is $21,000,000. This budget request combined with projected revenues of $10,000,000 should provide the Isotope Production and Distribution Fund sufficient capital to meet total estimated program expenses of $31,000,000.

Isotopes supports the DOE Strategic Plan and the fiscal year 2000 Performance Plan as follows:

- *Science and Technology Objective 2* - Deliver leading-edge technologies that are critical to the DOE mission and the Nation

  - Fiscal Year 2000 Strategy - The Department will develop new or improved isotope products and services that enable medical diagnoses and therapy, and other applications that are in the national interest, and encourage private sector investment in new isotope production ventures and sell or lease facilities and inventories for commercial purposes.

Program Goals

- Support, in collaboration with other Federal agencies, vital, advanced research that applies to DOE-produced research isotopes. *(Program Goal 1)*

- Develop new isotopes and isotope application technology to meet future national needs. *(Program Goal 2)*

- Provide a reliable supply of quality products and services based on customers' needs. *(Program Goal 3)*

Program Objectives

- Work with stakeholders, customers, and advisory groups to identify and develop new applications utilizing isotope products and technologies. *(Program Objective 1 supports Program Goal 2)*

- Support and encourage advanced research applying DOE-produced research isotopes. *(Program Objective 2 supports Program Goal 1)*

- Invest in new product processes and application development initiatives. *(Program Objective 3 supports Program Goal 2)*

- Manage and operate the Isotope Program in a cost-effective manner that best serves the interests of its customers and the U.S. taxpayers. *(Program Objective 4 supports Program Goal 3)*

- Continue to improve product quality and services and enhance customer satisfaction. *(Program Objective 5 supports Program Goal 3)*

- Ensure that environmental safety, health, and transportation safeguards requirements are met in the conduct of Isotope Program site activities. *(Program Objective 7 supports Program Goals 1, 2, and 3)*

- Achieve maximum private sector involvement in isotope activities by identifying those with privatization potential and then assisting the private sector in privatizing those that are commercially viable. *(Program Objective 8 supports Program Goal 3)*

Performance Measures

- In FY 1998, completed 80 percent of the Sandia Hot Cell Facility construction modifications and processing equipment installation activities needed to achieve the facility capability to process 100 percent of the U.S. demand for molybdenum-99. **(Fully Successful)**

- In FY 1999, initiate construction and commissioning of the Los Alamos Target Irradiation Station, improving isotope quality with greater operating efficiency.

- In FY 1999, complete equipment installation necessary for an emergency backup supply of molybdenum-99, issue a request for proposals to privatize molybdenum-99 production and business activities by May 1999, and after evaluation, award a contract by September 1999 to the most qualified firm.

- By the end of FY 2000, complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research.

- In FY 2000, implement the Advanced Nuclear Medicine Initiative by providing isotopes or financial assistance for up to five researchers.

- Complete privatization activities associated with production and sales of commercial isotopes by the end of FY 2000.

- Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. **(Fully Successful in FY 1998)**

- In FY 2000, invest in two new process development technologies, as requested by researchers, that enhances isotope production, services and delivery application systems.

- Respond to customer requests for information within 48 hours.

- Keep customer complaints to less than four percent of all deliveries made.

- Hold annual stakeholder meetings in conjunction with international and regional trade shows.

Significant Accomplishments And Program Shifts

- Researchers throughout the United States are assessing radioisotopes that emit alpha and beta particles that can destroy cancer cells and reduce tumors. For example rhenium-188 is a beta-emitting radioisotope that may prove useful in treating several cancers. Alpha-emitters such as bismuth-213 also have shown certain cancer therapy properties. Also, use of radioisotopes for the prevention of restenosis in helping arteries stay unclogged after coronary angioplasty. The Department will continue to provide limited support for production. Any changes or increases in

demand, due to success in pre-clinical trials, will require a change in production capability and additional resources.

- There is a growing demand for a reliable year-round supply of short-lived accelerator-produced isotopes for medical research. The Department is attempting to make accelerator isotopes available for up to 52 weeks. Without the completion of the Los Alamos Target Irradiation Station, the Department's ability to produce most important short-lived research isotopes will be virtually eliminated, resulting in a crucial shortage of research isotopes.

- The Isotope Program will seek cooperative supply agreements with other isotope manufacturers.

- Privatization of selected Isotope Program activities will result in a decrease in both expenses and resources. The program will continue to seek opportunities for the private sector to assume its activities.

- Continue to produce and distribute essential isotopes to meet national demand when no domestic or private sector capability exists; where unique Government production facilities are needed such as nuclear reactors or large accelerators; or where non-Federal productive capacity is insufficient to meet U.S. needs.

- Measure and enhance customer satisfaction by actively soliciting customer feedback and seeking to implement their recommendations.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Isotope Support					
Operation and Maintenance	19,473	15,500	0	15,500	13,000
Construction	0	6,000	0	6,000	8,000
Total Isotope Support	19,473	21,500	0	21,500	21,000

Funding by Site [a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	1,421	7,650	8,000	+350	+4.6%
Sandia National Laboratory	12,643	8,700	3,500	-5,200	-59.8%
Total, Albuquerque Operations Office	14,064	16,350	11,500	-4,850	-29.7%
Chicago Operations Office					
Brookhaven National Laboratory	1,600	2,000	2,200	+200	+10.0%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	2,730	2,800	2,970	+170	+6.1%
Richland Operations Office					
Pacific Northwest National Laboratory	550	350	0	-350	-100.0%
All Other Sites	529	0	4,330	+4,330	+100.0%
Total, Isotope Support	19,473 [b]	21,500	21,000	-500	-2.3%

Site Descriptions

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. The Isotope Production Facility at LANL operates about 22 weeks per year. This accelerator facility produces radioisotopes using either the primary proton beam or neutrons from the beam stop of the Los Alamos Neutron Science Center (LANSCE), a half-mile-long accelerator that delivers medium energy protons. The unique characteristics of the LANSCE accelerator include a high energy, high beam current that allows production of higher quality radioisotopes, as well as exotic radioisotopes that cannot be produced in other facilities. Three major products produced at the site are germanium-68, a calibration source for positron emission tomography (PET) scanners; strontium-82, the parent of rubidium-82, used in cardiac PET imaging; and sodium-22, a positron-emitter used in neurologic research.

[a] Since the Isotope Program operates like a business, funding at isotope production sites can increase or decrease depending on demand, cash collections, production efficiencies, and availability of facilities.

[b] Reflects an additional $3,700,000 provided through a transfer of appropriations to accelerate the capability to process 100 percent of the U.S. demand for Mo-99.

Sandia National Laboratory

Sandia National Laboratory (SNL) is a U.S. Department of Energy (DOE) scientific research laboratory located in New Mexico. SNL's Annual Core Research Reactor (ACRR) is a 2 megawatt, pool-type research reactor that is used to produce isotopes for medical applications. The ACRR is a highly flexible facility applied to the mission requirements of the Department in both isotope and national security applications.

Mo-99 is a precursor of technetium-99m, an isotope that is used in over 36,000 medical procedures per day in the United States to diagnose maladies such a cancer and heart disease. Sixty percent or more of the U.S. supply currently depends on a single aging reactor in Canada that will cease isotope production in the year 2004. The vulnerability of the Canadian supply was demonstrated when the labor force at the reactor site went on strike in June 1977 and May 1998. The ACRR and SNL's nearby Hot Cell Facility, along with LANL's Chemistry and Metallurgy Research Facility, have been modified for production of Mo-99 and related medical isotopes on an emergency basis if the foreign supply of Mo-99 is significantly disrupted. The capital investment to prepare for Mo-99 production will be completed in fiscal year 1999. The Mo-99 facility will be ready for the private sector to make further investments to implement routine commercial production.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a U.S. Department of Energy (DOE) scientific research laboratory located on Long Island, New York. The Brookhaven Linear Isotope Producer (BLIP) at BNL uses a linear accelerator that injects 200 million-electron-volt protons into the 33 billion-electron-volt Alternating Gradient Synchrotron. The BLIP facility operates about 16 weeks per year and produces radioisotopes such as strontium-82, germanium-68, copper-67, and others that are used in medical diagnostic applications. BNL is also active in the development of new isotope processes and delivery systems.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a U.S. Department of Energy scientific research laboratory located in Oak Ridge, Tennessee. The High Flux Isotope Reactor (HFIR) at ORNL provides one of the world's highest steady-state neutron fluxes. The reactor is normally scheduled to operate about 43 weeks per year to support primary missions other than isotope production. Isotope products made at this facility include: tungsten-188, rhenium-186, californium-252, and iridium-192. One target position with hydraulic capability to simultaneously load and unload up to eight target cans is available and is heavily used for medical radioisotope production. Additional peripheral target positions will become available in the second half of fiscal year 1998. The program depends heavily on HFIR for isotope production.

The electromagnetic calutrons at ORNL separate isotopes with the same atomic number, but different mass, to produce enriched stable isotopes. During this process, mixed isotope material is vaporized (heated) and then ionized. The ionized particles are accelerated, and their trajectories are bent by a magnetic field. The lighter particles separate from the heavier particles as they travel in an arc and are deposited on collectors, from which they are removed, chemically purified, and placed in inventory as enriched stable isotopes. Fifty-five chemical elements can be isotopically separated in the calutrons to produce 225 enriched stable isotopes. Currently, the calutrons are placed in a cold-standby mode with minimum maintenance.

All Other Sites

This category includes providing direct assistance to Universities or research institutions, or to DOE laboratories yet to be determined for producing isotopes or related reviews or to fund isotope related research based on a peer-reviewed selection process.

Operation and Maintenance

Mission Supporting Goals and Objectives

The Department, through the Isotope Program, provides radioactive and stable isotope products and associated services to a wide and varied domestic and international market. Ultimate applications of isotope products include medical research and health care, industrial research and manufacturing, education, and national defense. The Isotope Program mission is to serve the national need for a reliable supply of isotope products services and related science and technology used in medicine, industry, and research. The program supports development of new or improved isotope products and services that enable medical diagnoses and therapy, and other applications that are in the national interest. Prices charged for these products and services may not always achieve full-cost recovery to the Government. The Department encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production becomes well established, DOE will no longer supply that particular isotope.

Many uses for isotopes have emerged over the past generation as an adjunct of nuclear research, defense, and power development programs. As the range of available isotopes and the recognized uses for them have increased, isotope applications have become necessary to achieve progress in medical research and practice, new industrial processes, and scientific methodology.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operation and Maintenance	19,473	15,500	13,000	-2,500	-16.1%
Construction	0	6,000	8,000	+2,000	+33.3%
Total, Isotope Support	19,473	21,500	21,000	-500	-2.3%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Operations and Maintenance			
■ Isotope Production and Distribution maintains core personnel and operating capability at three of five sites and partial operations at a fourth isotope production site. The calutrons and the remaining sites will be maintained in a standby status. This will enable the production, packaging and distribution of radioactive and stable isotopes for about 18 major products, services, and processing of many forms and types of stable isotopes from inventory. This estimate was based on serving about 200 customers and over 1,100 deliveries. Limited support will also be provided for the separation of uranium, from existing stockpiles at Oak Ridge, for an expanding alpha-emitter isotope market. Maintain nuclear facility operations	10,330	10,300	10,500
■ Mo-99 Initiative			
▸ Conduct Operational Readiness Review for modified reactor, complete Hot Cell Facility major construction modifications for establishing full processing capacity, and initiate fabrication of the targets at the Los Alamos Chemistry and Metallurgy Research facility for future Mo-99 production	9,143	0	0
▸ Continue target production, install production scale target processing equipment in Hot Cell Facility, thus completing DOE's investment in this project. Complete the Mo-99 initiative	0	5,200	0
Total, Mo-99 Initiative	9,143	5,200	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Advanced Nuclear Medicine Initiative			
▸ Sponsor nuclear medical science using a peer review selection process. DOE support will be in two forms: direct research financial assistance and making isotopes available for research at prices that researchers can afford; ▸ Encourage the training of individuals in nuclear medicine methods by establishing university scholarships and fellowships for nuclear medicine specialists and by sponsoring summer internships at appropriate institutions; ▸ Initiate a focused program to apply alpha-emitting isotopes available in the U.S. from the DOE to fight a spectrum of malignant diseases including most common cancers and infectious diseases such as meningitis and AIDS. Non-malignant applications may include treatment of other immune disorders and of rheumatoid and degenerating joint diseases.	0	0	2,500
Total, Operation and Maintenance	19,473	15,500	13,000
Construction			
■ Complete engineering, design, and construction work inside the existing beam tunnel. Engineering and design of the new tunnel section and target station will be completed. Construction of the target station and new beam tunnel section will be started in FY 1999 and completion is expected in FY 2001. Any delay in schedule will result in a shortage of isotopes, loss of $1.5 million of revenue and incurred fixed costs of $2.3 million.	0	6,000	8,000
Total, Isotope Support	19,473	21,500	21,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Operations and Maintenance	
■ Complete the Mo-99 initiative	-5,200
■ Implement the Advanced Nuclear Medicine Initiative	+2,500
■ Increase in production costs	+200
Total, Operations and Maintenance	-2,500
Construction	
■ Construct the Los Alamos Target Irradiation Station for accelerator, medical, and research isotopes	+2,000
Total Funding Change, Isotope Support	-500

Capital Operating Expenses & Construction Summary

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998 Request	FY 1999 Approp.	FY 2000 Approp.	Unapprop. Balance
99-E-201, Isotope Production Facility, TA-53	14,000	0	0	6,000	8,000	0
Total, Construction		0	0	6,000	8,000	0

99-E-201, Isotope Production Facility, TA-53, Design and Construction, Los Alamos National Laboratory, Los Alamos, New Mexico

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1998	4Q 1998	1Q 1998	2Q 2000	12,065	12,843
FY 2000 Budget request *(Current Baseline Estimate)*	1Q 1999	4Q 1999	1Q 2000	3Q 2001	14,000	15,520

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1999	6,000	6,000	4,217
2000	8,000	8,000	7,430
2001	0	0	2,353

3. Project Description, Justification and Scope

This project proposes to build a new target irradiation facility for the production of radioisotopes at the Los Alamos Neutron Science Center (LANSCE) accelerator. The project started in FY 1999 will include installation of a beam switching device at the point where the beam is diverted, construction of a short beam line to the targeting area, and construction of a target handling facility with a beam stop. This facility will utilize a 100 MeV proton beam obtained by diverting a portion of the main LANSCE beam before it enters the final portion of the accelerator and directing it to a new targeting area dedicated to isotope production. In most cases production of radioisotopes is both more efficient and more selective with low beam energies (100 MeV) than with the high beam energy currently being used at Los Alamos (800 MeV). Therefore, once the new facility is in operation, the program will continue to produce most of the same isotopes, but with greater efficiency.

The proposed target irradiation facility will replace the existing Isotope Production Facility, which is located at TA-53 in building MPF-3 at the east end of Area A of LANSCE. However, Area A, where the existing Isotope Production Facility is located, will be rendered inoperable by the proposed reconfiguration of the LANSCE accelerator complex thereby, preventing Los Alamos to produce these isotopes.

The Isotope Program has been one of the more successful and visible ongoing activities at Los Alamos. It has used the unique capabilities of the Laboratory's facilities and staff to respond to a well recognized national need for radioisotope production and development. Today there are many customers in industry, research institutions, the medical community, academia, and other agencies who purchase the 30+ radioisotopes produced in the Isotope Production Facility at LANSCE. Because the current Laboratory plan to redirect the focus of the LANSCE accelerator complex toward neutron science, this has placed the use of the existing Isotope Production Facility in jeopardy. This change in focus can be viewed as an opportunity for the Isotope Production and Distribution Program to construct a dedicated radioisotope production facility which can operate on a noninterference basis with any of the proposed LANSCE configurations while at the same time operating at a lower beam intensity than the present Isotope Production Facility. This new facility would advance the Department of Energy's objective to be a reliable domestic source of research radioisotopes crucial for the future of industry, education and medicine.

The proposed facility would be located on the north side of the LANSCE linear accelerator (linac) building near the west end of the accelerator complex. A beam line would be built from the transition region between the Drift Tube Linac and the Side-Coupled Cavity Linac extending to the northeast to a targeting facility located to the north of Sector A. The new beam line will be approximately 100 feet in length with the beam line center expected to be between 20 and 35 feet below grade. The targeting facility would be located within a new building located above the end of the beam line. This building will be approximately 3000 square feet in area, and will house all the necessary equipment and control systems for carrying out target irradiations. This building will include a high bay area with overhead cranes.

This project will include design, excavation, and construction of the beam line tunnel, design and construction of the beam line and its control systems, design and construction of the building to house the targeting facility, and design and construction of the target handling and control systems. The beam tunnel construction modification must be completed during the LANSCE accelerator outage in 1999.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design	1,537	1,292
Design Management costs @ 20.9% of Design [a]	321	321
Project Management costs @ 19.7% of Design	303	211
Total, Design Phase	2,161	1,824
Construction Phase		
Improvements to Land	521	625
Buildings	3,229	3,129
Special Equipment	3,296	3,175
Utilities	158	61
Inspection, design and project liaison, testing, and acceptance	852	842
Construction Management @ 3.7% of Construction	298	290
Project Management @ 9.6% of Construction	773	568
Total, Construction Phase	9,127	8,690
Contingencies @ 24% of Design and Construction		
Design	737	496
Construction	1,975	1,055
Total, Contingencies	2,712	1,551
Total, line item costs (TEC)	14,000	12,065

5. Method of Performance

Procurement will be accomplished under fixed-price contracts awarded on the basis of competitive bidding. Utilities upgrades will be done by fixed price contractors and the Laboratory's support services contractor. The M & O contractor and contracted Architect-Engineers will perform construction inspection.

[a] Percentages are calculated for Current Estimate numbers only.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost						
Facility cost						
Design	0	2,805	91	0	0	2,896
Construction	0	1,412	7,339	2,353	0	11,104
Total, Line Item (TEC)	0	4,217	7,430	2,353	0	14,000
Other project costs						
Conceptual Design costs	545	0	0	0	0	545
Other ES&H costs	93	0	0	0	0	93
Other project related costs [a]	827	0	0	55	0	882
Total, Other project costs	1,465	0	0	55	0	1,520
Total Project Cost (TPC)	1,465	4,217	7,430	2,408	0	15,520

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	285	285
Annual facility maintenance/repair costs	111	111
Utility costs	39	39
Total related annual funding	435	435
Total operation cost (operating from FY 2003 through FY 2022)	8,700	8,700

[a] Other project related costs - This item includes the costs for creating as-builds for the existing facility beamline, shielding calculations, and engineering studies to refine the magnet, beamline and target designs to integrate into the existing facility.

Isotope Production and Distribution Program Fund

Program Mission

The Isotope Production and Distribution Program Fund provides all funds to the Isotope program which serves the national need for a reliable supply of isotope products, services and related technology used in medicine, industry, and research. As the range of available isotopes and the recognized uses for them have increased, isotope applications have become essential to progress in medical research and practice, new industrial processes, and scientific methodology. A substantial infrastructure has been built around the use of isotopes. Therefore, an adequate supply of medical and research isotopes is essential to the Nation's health care system, and to basic research and industrial applications that contribute to national economic competitiveness. The Department supports nuclear medicine research through direct financial assistance and by providing isotopes to researchers at reduced prices. The Department also encourages private sector investment in new isotope production ventures and will sell or lease its facilities and inventories for commercial purposes. If private sector production of a given isotope becomes well established. DOE will no longer supply that isotope.

Program Goals

Program goals for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Program Objectives

Program objectives for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Performance Measures

Performance measures for the Isotope Production and Distribution Fund are discussed in the Isotope Support section.

Funding Profile

No funds are requested for the Isotope Production and Distribution Fund. The budgetary resources for the Fund are received as spending authority from offsetting collections from two sources: (1) expenditure transfers of all appropriated funds from Energy Supply-Isotope Support; and (2) revenues from the sales of goods and services to the public. See the Isotope Support section for justification of the $21.0 million request for budget authority. Sales in FY 1998 were $11.0 million, and are estimated at $10.0 million for both FY 1999 and FY 2000.

Uranium Programs

Program Mission

This program supports important government activities related to the Federal uranium enrichment program that were not transferred to the United States Enrichment Corporation (USEC Inc.). In particular, this program addresses the facility and environmental legacies associated with the enrichment program, management of government assets, and associated research and development.

One of the principal missions of Uranium Programs activities is to effectively manage the Department's depleted uranium hexafluoride (DUF_6) inventories. The Department's major mission for depleted uranium is to ensure that an estimated 46,400 cylinders of depleted uranium hexafluoride are maintained in an environmentally responsible manner by conducting annual cylinder inspections, and developing and implementing options to repair cylinders exhibiting accelerated corrosion. In addition, the Department will complete an evaluation of a long-term management strategy options for the DUF_6 as part of a programmatic environmental impact statement. NE expects to issue a record of decision on this program in mid-FY 1999.

In addition to appropriations received for management of DOE-generated depleted uranium hexafluoride, the Department received in FY 1998 $66 million from the U.S. Enrichment Corporation for the management and disposition of about 11,200 additional USEC-generated depleted uranium cylinders. In response to the FY 1999 appropriations language, the Department submitted, on December 17, 1998, its initial plan for applying the $66 million received from USEC. These funds are administered in accordance with the terms of the two Memoranda of Agreement (MOAs) and related correspondence for activities required to accept and maintain the USEC material.

On July 21, 1998 the President signed P.L. 105-204, an act requiring that the Secretary of Energy prepare a plan and proposed legislation for the disposition of depleted uranium hexafluoride. This plan is being prepared and is expected to be submitted to Congress with the President's new legislative budget proposals.

Other Uranium Programs activities at the gaseous diffusion plants in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee include maintenance of facilities and grounds, cleaning legacy PCB spills in the leased areas of the diffusion site consistent with the Federal Facilities Compliance Act, guarding and protecting HEU material stored at the Portsmouth site, and addressing financial liabilities by paying post retirement life and medical costs for retired contractor personnel at the diffusion sites and power suppliers, and by providing legal representation for existing lawsuits. Lastly, after assisting in the transfer of regulatory oversight of the leased facilities and obtaining an initial certificate of compliance from the Nuclear Regulatory Commission (NRC), the Department continues to review and update Safety Analysis Reports (SARs) as necessary, for the non-leased facilities and assist the NRC in preparing annual congressional reports on the status of the diffusion plants.

NE is also responsible for the management and disposition of the Department's excess natural uranium inventories. These excess inventories include uranium originally purchased for government purposes, and inventories received from the U.S./Russia Highly Enriched Uranium Purchase Contract as directed by the USEC Privatization Act. In FY 1999, NE will administer $325.0 million provided in the emergency appropriations bill (P.L. 105-277) for the purchase of natural uranium pursuant to 1997 and 1998 deliveries under the U.S./Russian HEU Agreement.

Uranium Programs supports the DOE Strategic Plan and the FY 2000 Performance Plan as follows:

Environmental Quality Objective 6 - Reduce life-cycle costs of environmental cleanup.

- FY 2000 Strategy - The Department will reduce the disposition cost of depleted uranium by exploring and developing alternative government uses for the material. Perform depleted uranium hexafluoride cylinder maintenance activities that are protective of workers and the environment.

Program Goals

- Manage Office of Nuclear Energy, Science and Technology (NE) facilities at Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee in a safe, economic, and environmentally-sound manner. *(Program Goal 1)*

- Ensure that the estimated 46,400 cylinders of depleted uranium hexafluoride within the DOE inventory are maintained in an environmentally responsible manner by conducting annual inspections and exploring options to effectively treat cylinders that exhibit accelerated corrosion, and conducting cost-shared projects with industry for the conversion of UF_6 to uranium oxide and/or metal. The Department is completing an environmental impact statement on the long-term management of its inventory of depleted uranium. A record of decision will be issued by mid-FY 1999. *(Program Goal 2)*

- Maintain in an environmentally safe condition the cylinders of DUF_6 received from USEC. *(Program Goal 3)*

- Prudently manage the Department's inventory of excess natural uranium, including Russian uranium transferred to the Department from USEC as required by the USEC Privatization Act. *(Program Goal 4)*

Program Objectives

- Manage the collection and disposal of PCB spills at the leased gaseous diffusion plants and maintain the non-leased facilities in a safe and environmentally-sound condition. *(Program Objective 1 supports Program Goal 1)*

- Manage the pre-existing liabilities incurred before the creation of the USEC in 1993 and manage the additional liabilities as a result of the 1996 legislation supporting the privatization of USEC. *(Program Objective 2 supports Program Goal 1 and 2)*

- Manage and disposition natural uranium and depleted uranium hexafluoride inventories in a safe, economic, and environmentally-sound manner. *(Program Objective 3 supports Program Goal 3)*

Performance Measures

- In FY 1998, completed the dilution of about 14 metric tons of excess highly enriched uranium (approximately 3.5 metric tons in FY 1998) to LEU at the Portsmouth Gaseous Diffusion Plant. *(Performance Measure supports Program Objective 3)* **(Fully Successful)**

- In FY 1998, completed 80 percent of the final programmatic environmental impact statement for selecting the long-term management strategy for the depleted UF_6. *(Performance Measure supports Program Objective 3)* **(Successful)**

- In FY 1999, remove all highly enriched uranium oxides from the Portsmouth site. *(Performance Measure supports Program Objective 5)*

- Meet all legal commitments for post-retirement life and medical costs for retirees who supported the Uranium Enrichment Program before July 1, 1993. *(Performance Measure supports Program Objective 2)*

- Maintain compliance with the Toxic Substances Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements and perform minimal corrective maintenance and inspections. *(Performance Measure supports Program Objective 1)*

- Meet all commitments to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride. *(Performance Measure supports Program Objective 3)*

- In FY 2000, through the NEPA decision-making process, establish and begin implementing the long-term strategy for the management of the Department's depleted uranium hexafluoride inventories. *(Performance Measure supports Program Objective 3)*

Significant Accomplishments And Program Shifts

- The transparency measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget.

- In FY 1999, complete the transfer of remaining highly enriched uranium oxides at the Portsmouth Site to USEC for dilution to low enriched uranium as authorized by the USEC Privatization Act of 1996 (P.L. 104-134, Subchapter A).

- A Memorandum of Agreement between DOE and USEC dated May 18, 1998 was signed that provided for USEC to pay DOE $16 million in complete satisfaction of USEC's obligation for all costs associated with the storage of the depleted uranium generated by USEC during the pre-privatization period. On June 30, 1998, USEC and DOE signed another Memorandum of Agreement under which 16.6 million kgU of USEC depleted uranium generated after privatization will transfer to DOE, in exchange for $50 million. On December 17, 1998, the Department submitted its initial plan to Congress for applying the $66 million received from USEC under the two MOAs.

- A draft programmatic environmental impact statement (PEIS) on the long-term management of the Department's depleted uranium was issued for public comment on December 24, 1997. The Department plans to issue the final PEIS in the second quarter of FY 1999 and the related record of decision (ROD) in mid-FY 1999.

- Conduct demonstration projects that have the objectives of: (1) reducing the eventual disposal cost of depleted uranium; and (2) stimulating the use of depleted uranium and thereby reduce the level of material that must be disposed in the future.

- On July 21, 1998, the President signed P.L. 105-204, an act requiring that the Secretary of Energy develop a plan and proposed legislation for the disposition of depleted uranium hexafluoride and for the construction of, beginning no later than January 31, 2004, facilities at Paducah and Portsmouth to treat and recycle depleted uranium hexafluoride consistent with the National Environmental Policy Act. This plan is being prepared and is expected to be submitted with the President's new legislative budget proposals.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Uranium Programs					
Operation and Maintenance	41,633	49,000	0	49,000	41,000
Construction	3,000	0	0	0	0
Total, Uranium Programs [a] [b]	44,633 [c]	49,000 [d]	0	49,000 [d]	41,000

[a] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer included in the Uranium Programs budget.

[b] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[c] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[d] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	850	800	0	-800	-100.0%
Sandia National Laboratory	1,360	1,250	0	-1,250	-100.0%
Total, Albuquerque Operations Office	2,210	2,050	0	-2,050	-100.0%
Chicago Operations Office					
Argonne National Laboratory (East)	1,893	1,160	300	-860	-74.1%
Brookhaven National Laboratory	135	0	0	0	0.0%
New Brunswick Laboratory	555	530	0	-530	-100.0%
Total, Chicago Operations Office	2,583	1,690	300	-1,390	-82.2%
Nevada Operations Office	518	440	0	-440	-100.0%
Oakland Operations Office					
Oakland Operations Office	750	900	0	-900	-100.0%
Lawrence Livermore National Laboratory	7,179	5,615	400	-5,215	-92.9%
Total, Oakland Operations Office	7,929	6,515	400	-6,115	-93.9%
Oak Ridge Operations Office					
Oak Ridge Operations Office	11,325	9,197	10,400	+1,203	+13.1%
East Tennessee Technology Park	6,714	7,426	10,813	+3,387	+45.6%
Paducah Gaseous Diffusion Plant	8,407	5,064	5,849	+785	+15.5%
Portsmouth Gaseous Diffusion Plant	3,460	15,893	12,708	-3,185	-20.0%
Total, Oak Ridge Operations Office	29,906	37,580	39,770	+2,190	+5.8%
Richland Operations Office					
Pacific Northwest National Laboratory	45	25	530	+505	+2,020.0%
All Other Sites	1,442	700	0	-700	-100.0%
Total, Uranium Programs [a] [b]	44,633 [c]	49,000 [d]	41,000	-8,000	-16.3%

[a] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer included in the Uranium Programs budget.

[b] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[c] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[d] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Site Descriptions

Oak Ridge Operations

The Oak Ridge Operations (ORO) Office is one of the major Field Offices that support the U. S. Department of Energy's Nuclear Energy Program Office. ORO is responsible for fulfilling DOE's contractual liability with respect to retired management and operating contractor employees of the Paducah and Portsmouth facilities as well as retired power supplier employees, and for representing DOE in litigation activities arising from Uranium Enrichment activities prior to July 1, 1993. ORO also provides support for planning, developing, and executing strategies for the disposition of the DUF_6 inventory.

ORO is located in three sites: the Ohio site near Portsmouth, Ohio, the Kentucky site near Paducah, Kentucky, and the Tennessee site located in Oak Ridge Tennessee.

East Tennessee Technology Park (formerly K-25 site)

The East Tennessee Technology Park (ETTP) is located in Oak Ridge, Tennessee, and is responsible for supporting the nuclear safety activities required to meet Departmental obligations under the Energy Policy Act of 1992 by assisting the NRC in the preparation of an annual report to Congress on the status of health, safety, and environmental conditions at the GDPs, Management Oversight of the Enrichment Facilities Operations, the management of U.S. Department of Energy liabilities arising from Uranium Enrichment activities prior to July 1, 1993, the DUF_6 Cylinder Maintenance project which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material, the DUF_6 Conversion tasks, and the administration of the Lease Agreement between DOE and the United States Enrichment Corporation (USEC Inc.).

Paducah Gaseous Diffusion Plant

The Paducah Gaseous Diffusion Plant is located on 3,423 acres near Paducah, Kentucky, and is responsible for supporting several activities including: (1) review and update of Safety Analysis Reports as necessary, and assistance with the preparation of NRC's annual report to Congress; (2) the maintenance of nonleased facilities which includes effort in both active and inactive facilities to protect the safety and health of personnel and the environment as well as biological monitoring activities at the Paducah Gaseous Diffusion Plant; (3) the PCB Program which includes activities related to achieving and maintaining compliance with Toxic Substance Control Act of 1976 (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement, and DOE Orders and other applicable requirements. Specific PCB activities include oversight of the collection and containment system, management of TSCA regulated PCB spill sites, and management of waste generated from these activities; and (4) the DUF_6 Cylinder Maintenance activity which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material.

Portsmouth Gaseous Diffusion Plant

The Portsmouth Gaseous Diffusion Plant is located on 3,714 acres near Portsmouth Ohio, and is responsible for supporting several activities including: (1) the HEU Equipment Shutdown and Inventory Disposition Program which removes all HEU materials (materials with assays greater than 20%) from the Portsmouth site, as well as buffering shut down production equipment for nuclear criticality safety purposes, program and business management, safety authorization basis management, and other technical support associated with HEU material; (2) review and update Safety Analysis Reports as necessary, and assistance with the preparation of NRC's annual report to Congress; (3) the maintenance of nonleased facilities which includes effort in both active and inactive facilities to protect the safety and health of personnel and the environment of nonleased facilities at the Portsmouth Gaseous Diffusion Plant; (4) the PCB Program which includes activities related to achieving and maintaining compliance with Toxic Substance Control Act of 1976 (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement, and DOE Orders and other applicable requirements. Specific PCB activities include oversight of the collection and containment system, management of TSCA regulated PCB spill sites, and management of waste generated from these activities; and (5) the DUF_6 Cylinder Maintenance activity which has the responsibility to safely store the existing inventory of DUF_6 until ultimate disposition of the material.

Argonne National Laboratory

Argonne National Laboratory, through its offices at 9700 S. Cass Avenue, Argonne, Illinois and at 955 L'Enfant Plaza, Washington, D.C., is providing scientific and engineering expertise to the U.S. Department of Energy Office of Nuclear Facilities Management related to management of depleted uranium hexafluoride.

As part of this support, Argonne is conducting engineering and cost evaluations of options for storage and use of the depleted uranium inventory. Argonne is supporting the Department by managing a programmatic environmental impact statement that examines the environmental, health, safety and socioeconomic impacts of alternative management strategies for the depleted uranium inventory. In addition, Argonne is examining potential uses of materials derived from depleted uranium hexafluoride that can provide an overall economic benefit to the Government.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory, through its Germantown, Maryland office and parent Livermore, California facility, provides scientific and engineering expertise related to management of DUF_6.

Areas of technical expertise provided include: materials technology, testing expertise and testing facilities, safety analyses, quality program analyses, transportation safety analyses, facility design and development, engineering analysis, cost modeling and analysis, and other technical support as requested.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is located in Richland, Washington and provides scientific and engineering expertise related to management of depleted uranium.

Areas of technical expertise provided include: material properties research, alloy development, thermo-mechanical processing, coatings technology, fabrication technology development, depleted uranium product development, and other technical support as requested.

All Other Sites

Funding provided to universities, industry, other federal agencies, and other activities to support Uranium Programs activities.

Operation and Maintenance

Mission Supporting Goals and Objectives

Uranium Programs' activities are primarily focused on accomplishing three major goals:

The first goal is to manage facilities not leased by the USEC in a safe, economic, and environmentally-sound manner. Uranium Programs activities at the gaseous diffusion plants in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee include maintenance of facilities and grounds, cleaning legacy PCB spills, guarding and protecting HEU material stored at the Portsmouth site, addressing financial liabilities by paying post retirement life and medical costs for retired contractor personnel at the diffusion sites and power suppliers, providing legal representation for existing lawsuits, and reviewing and updating Safety Analysis Reports (SARs) as necessary, for the non-leased facilities and assisting the NRC in preparing annual congressional reports on the status of the diffusion plants. Highlights in support of this goal include:

- Consistent with the requirements of the 1992 Energy Policy Act, continue to pay retired employee post-retirement life and medical benefits and legal representation on behalf of DOE for lawsuits against DOE.

- Continue residual safeguards and security costs for a small contingent of guards and one building with HEU inventories as most material is removed from the HEU building X-326 at Portsmouth, and perform maintenance and surveillance of the shut down HEU equipment.

- The major activity related to nuclear safety was completed March 3, 1997, when the NRC assumed the regulatory authority of the leased gaseous diffusion plants. For FY 2000, Uranium Programs will continue review and update Safety Analysis Reports (SARs) as necessary, for the non-leased facilities, and assist with preparation of NRC's annual report to Congress.

- Continue to perform routine maintenance activities at the non-leased facilities. Activities include safety and health inspections, and corrective maintenance. The program will maintain PCB troughing systems in the process buildings leased to USEC, which involves routine inspections, repairs, spill cleanup and laboratory analysis.

The second goal is to ensure that the estimated 46,400 cylinders within the DOE inventory of depleted uranium hexafluoride are maintained in an environmentally responsible manner by conducting annual inspections and exploring options to effectively treat cylinders that exhibit accelerated corrosion. The Department is completing an environmental impact statement on the long-term management of its inventory of depleted uranium hexafluoride. We expect to issue a record of decision (ROD) by mid-FY 1999.

The DUF_6 Cylinders and Maintenance program maintains the current DOE-generated DUF_6 inventory to assure safe storage. Cylinder management involves the general maintenance and monitoring of the estimated 46,400 DUF_6 cylinders, including such activities as:

- Annually inspect DUF_6 cylinders, repair defective cylinder valves as required, maintain procedures for conduct of operation, and maintain data base, including updating of inspection data. Conduct quadrennial inspections of other DUF_6 cylinders. Develop remote sensing inspection technologies to detect cylinder leaks and determine cylinder wall condition.

- Relocate DUF_6 storage cylinders to permit 100 percent visual inspection and ultrasonic inspection and procure concrete saddles (cylinders sit on saddles).

- Continue the control of cylinder corrosion by surface cleaning and painting.

- Construction and reconstruction of cylinder storage yards.

In addition to appropriations required for management of DOE-generated depleted uranium hexafluoride, the Department received in FY 1998 $66 million from the U.S. Enrichment Corporation for the management and disposition of about 11,200 of additional USEC-generated depleted uranium cylinders. In response to the FY 1999 appropriations language, the Department submitted, on December 17, 1998, its initial plan for applying the $66 million received from USEC. These funds are administered in accordance with the terms of the two Memoranda of Agreement (MOAs) and related correspondence for activities required to accept and maintain the USEC material. The Department will revise its plan for applying the $66 million received from USEC and intends to include the revisions in the President's *Plan for the Conversion of Depleted Uranium Hexafluoride* required under P.L. 105-204.

The draft *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (PEIS) was issued in December 1997 and the final PEIS identifying the Department's preferred alternative is currently scheduled for completion in February 1999. The record of decision (ROD) for the proposed action is scheduled to be issued in mid-FY 1999.

As discussed above, the Department will submit a plan to begin construction of DUF_6 conversion facilities at the GDP sites by January 2004. To support construction start in January 2004, the Department has requested $5.0M in appropriations to conduct NEPA and procurement activities. This law authorized the use of approximately $373 million identified by USEC for the disposition of DUF_6, and specifically, to enable the construction of plants to convert the material. The Department's plan will be forwarded by the President with his FY 2000 legislative proposals.

The third goal of Uranium Programs is to manage the sale of the Department's excess inventory of natural uranium. The sale of these inventories is accomplished in a manner which will maximize the return to the U. S. government while ensuring such sales meet the intent of the USEC Privatization Act and do not have an adverse material impact on domestic uranium industries. The Department performs analysis in consultation with the uranium industry in support of the Secretary of Energy's determination with regard to the sale of excess Departmental uranium on the uranium industries.

Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	0	11,500 [a]	3,700	-7,800	-67.8%
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	3,807	7,757	10,400	+2,643	+34.1%
Pre-existing Liabilities	8,587	6,037 [b]	8,400	+2,363	+39.1%
Depleted Uranium Hexafluoride Cylinders and Maintenance	12,863	10,126	10,874	+748	+7.4%
Depleted Uranium Hexafluoride Conversion	976	0	7,563 [c]	+7,563	+100.0%
Transparency Measures [d]	15,400	13,580	0	-13,580	-100.0%
SBIR	0	0	63	+63	+100.0%
Total, Operation and Maintenance [e]	41,633 [f]	49,000 [g]	41,000	-8,000	-16.3%

[a] Excludes $8.0 million in prior year balances.

[b] Excludes $2.55 million of prior year balances.

[c] Includes $5 million requested from P.L. 105-204.

[d] The HEU Transparency Measures program transferred to the Office of Nonproliferation and National Security and beginning in FY 2000 is no longer in the Uranium Programs budget.

[e] Additional funding from the MOAs between USEC and DOE will be used in FY 1999 and FY 2000 for depleted uranium cylinder maintenance; construction of cylinder yards at Paducah and Portsmouth; and other depleted uranium activities.

[f] Excludes $19.2 million reprogrammed to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).

[g] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition			
■ Residual safeguards and security costs for a small contingent of guards and one building as all material is removed from HEU building X-326 by the end of FY 1999	8,563	7,107	2,420
■ Surveillance and maintenance activities associated with the 158 permanently shut down cells in the HEU building X-326	520	807	761
■ Removal of HEU material and power and utilities required for the 158 shutdown cells in X-326 and limited operation of building X-345 (HEU vault)	4,430	3,074	281
■ Oversight and management of the HEU removal program is reduced as material is dispositioned	438	512	238
■ No work scope for IAEA inspections support in FY 1999 and FY 2000	49	0	0
■ The Department received a one-time credit for the purchase of contractual services from the USEC associated with a higher than expected quantity of low enriched uranium that USEC was able to derive from the dilution of highly enriched uranium transferred by the Department. The credit was subsequently used as a funding source for the $19.2 million reprogramming to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility (FFTF) ($9.2million)	-14,000	0	0
Total, Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	0	11,500 [a]	3,700

[a] Excludes $8.0 million of prior year balances.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety			
■ Management of PCB activities associated with maintaining compliance with the Toxic Substance Control Act (TSCA), the Uranium Enrichment TSCA Federal Facilities Compliance Agreement (FFCA), DOE orders and other requirements	3,060	3,621	4,211
■ Minimal corrective maintenance and inspection of 5 active and 29 inactive facilities at the Portsmouth and Paducah sites	4,522	3,234	4,989
■ Support for Annual Report to Congress on the status of environmental, safety, and health (ES&H) conditions at the Gaseous Diffusion Plants, as required by the Energy Policy Act of 1992, and the annual Safety Analysis Report (SAR) update for the non-leased facilities	1,075	392	800
■ Environmental monitoring activities as required by the Kentucky Pollutant Discharge Elimination System (KPDES) including toxicity monitoring for liquid effluents, in-stream monitoring for PCBs in fish, in-stream ecological monitoring of the biotic community, and a small mammals study.....	350	510	400
■ The Department received a one-time credit for the purchase of contractual services from the USEC associated with a higher than expected quantity of low enriched uranium that USEC was able to derive from the dilution of highly enriched uranium transferred by the Department. The credit was subsequently used as a funding source for the $19.2 million reprogramming to the Uranium Enrichment Decontamination and Decommissioning Fund ($10.0 million) and the Fast Flux Test Facility ($9.2 million).	-5,200	0	0
Total, Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	3,807	7,757	10,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Pre-Existing Liabilities			
■ Contractual liability for Lockheed Martin Energy Systems (LMES) post-retirement life and medical expenses for 2,300 employees with service prior to July 1, 1993	6,942	5,362 [a]	8,000
■ Outside counsel attorney fees and expenses for about 7 open class action, unfair labor practices, civil rights/wrongful discharge and other litigation against the Department	1,645	675	400
Total, Pre-Existing Liabilities	8,587	6,037	8,400
Depleted Uranium Hexafluoride Cylinders and Maintenance			
■ Relocation of a few DOE cylinders to improve storage conditions	2,495	300	70
■ Personnel, equipment, and materials to recoat about 1,200 DOE cylinders to provide a barrier between the cylinder wall and the moist environment that contributes to the deterioration of the cylinder	2,279	4,300	2,454
■ Personnel and materials necessary to monitor cylinder and storage yards. Conduct annual inspections, quadrennial inspections, and wall thickness inspections at Paducah, Portsmouth, and Oak Ridge	796	1,200	1,400
■ Management and general maintenance of an estimated 46,400 cylinders and 16 cylinder yards at Paducah, Portsmouth and Oak Ridge	4,756	3,426	6,450
■ Materials and personnel performing engineering development type work necessary to sustain, optimize and enhance the cylinder storage system	567	900	500
■ PEIS scheduled to be released early FY 1999	1,970	0	0
Total, Depleted Uranium Hexafluoride Cylinders and Maintenance	12,863	10,126	10,874

[a] Excludes $2.55 million of prior year balances.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Depleted Uranium Hexafluoride Conversion			
■ Research and development on alternative uses of depleted uranium hexafluoride for possible government applications which may reduce the cost of Federal Government Programs.	976	0	2,563
■ Preparation of site specific NEPA activities in accordance with the P.L. 105-204 plan to begin construction of a conversion facility(s) by FY 2004	0	0	3,000 [a]
■ Preparation of Request for Proposals for a conversion facility(ies) to meet the schedule in accordance with P.L. 105-204	0	0	2,000 [a]
Total, Depleted Uranium Hexafluoride Conversion	976	0	7,563
Transparency Measures			
■ The transparency measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget	15,400	13,580	0
Small Business Innovative Research and Small Business Technology Transfer Programs			
■ FY 99/00 Small Business Innovative Research and Small Business Technology Transfer Programs	0	0	63
Total, Operation and Maintenance	41,633	49,000 [b]	41,000

[a] Funds requested from the USEC account under P.L. 105-204.

[b] Excludes $325 million emergency appropriation (P.L. 105-277) for the purchase of natural uranium associated with 1997 and 1998 deliveries under U.S./Russian HEU purchase agreement.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Highly Enriched Uranium Equipment Shutdown and Inventory Disposition	
■ Safeguards costs will decrease once the Department's HEU oxide inventories are removed from the Portsmouth site during FY 1999	-7,800
Maintenance of Leased and Non-Leased Facilities Including Corrective Actions and Nuclear Safety	
■ Reflects increased costs for PCB disposal and other corrective maintenance activities	+2,643
Pre-existing Liabilities	
■ Funding in FY 1999 was supplemented by prior year balances of $2.55 million within the pre-existing liabilities account. Therefore, there is no real increase in this activity in FY 2000	+2,363
Depleted Uranium Hexafluoride Cylinders and Maintenance	
■ Reflects a minimal increase for the continuation of required depleted uranium cylinders and cylinder yard maintenance activities.	+748
Depleted Uranium Hexafluoride Conversion	
■ Reflects implementation of research and development activities associated with finding alternative government uses for depleted uranium hexafluoride	+2,563
■ Funds requested from the USEC account under P.L. 105-204.	+5,000
Total, Depleted Uranium Hexafluoride Conversion	+7,563

	FY 2000 vs. FY 1999 ($000)
Transparency Measures	
■ The Transparency Measures program has been transferred from of the Office of Nuclear Energy, Science and Technology to the Office of Nonproliferation and National Security, and beginning in FY 2000 is no longer included in the Uranium Programs budget	-13,580
Small Business Innovative Research and Small Business Technology Transfer Programs	
■ Funding required to support the Small Business Innovative Research and Small Business Technology Transfer Programs	+63
Total Funding Change, Operation and Maintenance	-8,000

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	128	150	0	-150	-100.0%
Capital Equipment	185	555	220	-335	-60.4%
Total, Capital Operating Expenses	313	705	220	-485	-68.9%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
98-U-200 DUF_6 Cylinder Storage Yards, K-25 Site, Oak Ridge, TN	5,700	0	400	0	0	5,300
96-U-201 DUF_6 Cylinder Storage Yards, Paducah, KY Gaseous Diffusion Plant	34,000	7,000	2,600	0	0	24,400
Total Construction		7,000	3,000	0	0	29,700

Program Direction

Mission Supporting Goals and Objectives

The Office of Nuclear Energy, Science and Technology (NE) Program Direction account funds expenses associated with the technical direction and administrative support of NE programs.

Program Direction has been grouped into four categories:

Salaries and Benefits provides salary and benefits funding for Headquarters and Operations Office personnel providing technical direction to Nuclear Energy Research and Development activities, Isotope programs, Termination Cost programs, Uranium programs, as well as Office of Science funded energy research reactor operations (*e.g.*, the High Flux Isotope Reactor at the Oak Ridge National Laboratory), transition activities at the Fast Flux Test Facility (FFTF), and activities funded by other Federal agencies and foreign governments. This category includes funding for other personnel compensation, such as, cash incentive awards and overtime pay.

Travel includes funding for transportation of Headquarters and Operations office employees associated with NE programs, their per diem allowances while in authorized travel status, and other expenses incidental to travel.

Support services includes funding for technical and management support services provided to NE Headquarters and Operations office employees.

Other related expenses includes funding for administrative expenses, such as: training, computer hardware and software acquisitions, modifications, and publication and subscription services. In FY 1997, the Department's central administrative office established a Working Capital Fund to provide funding for mandatory administrative costs, such as, rent and telephone services. Payments into this fund are continued as part of the other related expenses category.

In FY 2000 the salary, benefits, travel, and related administrative expenses for the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program have not been included based on the reassignment of these functions to the Office of Nonproliferation and National Security.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago					
Salaries and Benefits	1,202	1,239	1,376	+137	+11.1%
Travel	105	82	86	+4	+4.9%
Support Services	91	50	60	+10	+20.0%
Other Related Expenses	32	42	44	+2	+4.8%
Total, Chicago	1,430	1,413	1,566	+153	+10.8%
Full Time Equivalents	12	12	12	0	0.0%
Idaho					
Salaries and Benefits	95	95	104	+9	+9.5%
Travel	10	10	10	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	3	3	3	0	0.0%
Total, Idaho	108	108	117	+9	+8.3%
Full Time Equivalents	1	1	1	0	0.0%
Oak Ridge					
Salaries and Benefits	2,536	2,389	2,511	+122	+5.1%
Travel	90	91	71	-20	-22.0%
Support Services	118	450	500	+50	+11.1%
Other Related Expenses	449	589	462	-127	-21.6%
Total, Oak Ridge	3,193	3,519	3,544	+25	+0.7%
Full Time Equivalents [a]	28	27	27	0	0.0%
Oakland					
Salaries and Benefits	200	200	108	-92	-46.0%
Travel	35	10	10	0	0.0%
Support Services	5	0	0	0	0.0%
Other Related Expenses	18	32	23	-9	-28.1%
Total, Oakland	258	242	141	-101	-41.7%
Full Time Equivalents [a]	2	2	1	-1	-50.0%

[a] Excludes reimbursables.

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland					
Salaries and Benefits	600	451	622	+171	+37.9%
Travel	10	15	16	+1	+6.7%
Support Services	0	0	0	0	0.0%
Other Related Expenses	0	0	0	0	0.0%
Total, Richland	610	466	638	+172	+36.9%
Full Time Equivalents	5	5	6	+1	+20.0%
Headquarters					
Salaries and Benefits	12,502	12,885	11,169	-1,716	-13.3%
Travel	518	676	525	-151	-22.3%
Support Services	300	3,200	5,290	+2,090	+65.3%
Other Related Expenses	2,081	2,191	1,970	-221	-10.1%
Total, Headquarters	15,401	18,952	18,954 [a]	+2	+0.0%
Full Time Equivalents	129	123	93	-30	-24.4%
Total Nuclear Energy					
Salaries and Benefits	17,135	17,259	15,890	-1,369	-7.9%
Travel	768	884	718	-166	-18.8%
Support Services	514	3,700	5,850	+2,150	+58.1%
Other Related Expenses	2,583	2,857	2,502	-355	-12.4%
Subtotal, Program Direction	21,000	24,700 [b]	24,960 [a]	+260	+1.1%
Use of Prior-Year Balances	0	0	0	0	0.0%
Total, Program Direction	21,000	24,700 [b]	24,960 [a]	+260	+1.1%
Full-Time Equivalents	177	170	140 [a]	-30	-17.6%

[a] The salary, benefits, travel, and related administrative expenses for the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program have not been included in FY 2000 based on the reassignment of these functions to the Office of Nonproliferation and National Security.

[b] Excludes $2.15 million included in a reprogramming.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
NE Headquarters has streamlined its organizational structure from a multilayered organization to a single layered organization; downsized from 258 employees in 1993 to a current level of 96 employees (excluding 27 International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs employees reassigned to the Office of Nonproliferation and National Security); met strategic Alignment Initiative staffing targets; met or exceeded National Performance Review targets; retrained and redeployed administrative staff to reduce dependence on contractors; and redirected and realigned staff (most recently in August 1998) to accomplish program goals efficiently and effectively. NE field staffing has also been reduced from 75 in August 1995 to a current level of 47. The current assignment of NE field employees includes Chicago Operations Office (12), Idaho Operations Office (1), Oakland Operations Office (2), Oak Ridge Operations Office (27), and the Richland Operations Office (5). FY 1998 and FY 1999 salaries and benefits include appropriated funds for employees reassigned on October 11, 1998 to the Office of Nonproliferation and National Security. The FY 2000 salaries and benefits amount does not include funds for INSP and HEU Transparency Measures Program staff. As part of the Department's Workforce 21 initiative, authorization has been requested for twelve additional Headquarters positions in accordance with the January 11, 1999 NE Workforce Staffing Plan ...	17,135	17,259	15,890

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Travel			
In accordance with the Departmental initiative to reduce travel costs, a series of actions have been taken to reduce Headquarters travel. Guidelines were issued to eliminate unnecessary or low value travel, multiple travelers to the same location/meeting are being limited. Conference attendance is being severely limited. Use of video-conferencing is encouraged whenever possible. NE field employees travel costs are similarly included in the Departmental travel costs reduction initiative. FY 1998 and FY 1999 travel includes appropriated funds for International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs Headquarters and Operations Office travel expenses. The FY 1999 travel budget also includes funding provided to support the temporary overseas assignment of one Operations Office employee to the Nuclear Energy Agency. The FY 2000 amount does not include Headquarters and Operations Office expenses for INSP and HEU Transparency Measures Program travel based on the reassignment of these programs to the Office of Nonproliferation and National Security on October 11, 1998.	768	884	718
Support Services			
In accordance with the Departmental initiative to reduce the level of support services contracting, NE has reduced Headquarters support services contracting from $10.6 million in support services contracts in FY 1995. NE's FY 1998 support services contracting (Headquarters and Field) was $ 6.809 million (including amounts in program budgets). Beginning in FY 1999, in accordance with Congressional direction, all funds for support services contracting were included in the Program Direction budget. FY 1999 funds include both Headquarters ($ 3.2 million) and Field ($ 0.5 million) support services contracting. FY 1999 funding does not include $2.15 million pending submittal of a reprogramming request for essential support services. FY 2000 funding is based on the revised FY 1999 request level. Support services for NE Field employees are in accordance with Operations Office plans to reduce support services contracting as part of the same Departmental support services cost reduction initiative	514	3,700 *	5,850

* Excludes $2.15 million included in a reprogramming.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
FY 1998 and 1999 amounts include appropriated funds for International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs other related expenses. The FY 2000 amount does not include expenses for the INSP and HEU Program based on the October 11, 1998 reassignment of these programs to the Office of Nonproliferation and National Security. The single largest expenditure ($1.35 million in FY 2000) in the other related expenses category is earmarked for the Headquarters Working Capital Fund (WCF). Compared to FY 1998, FY 1999 WCF funding increased $110K, primarily for additional office space costs occasioned by the transfer of the International Nuclear Safety Program and the Highly Enriched Uranium Transparency Measures Program staff from NE to NN. Operations Office funding also increased ($170K) in accordance with annual operations plans. The Other Related Expense category also includes a payment for the recovery of Departmental Administration and Security Investigations costs incurred by Departmental elements with regard to NE's Isotope Program. Finally, this category includes expenses for ADP hardware and software support, training, periodicals and subscriptions, etc. ...	2,583	2,857	2,502
Total, Program Direction	21,000	24,700	24,960

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Decrease is due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs to the Office of Nonproliferation and National Security (-3,007) and adjustments for general pay increases, promotions, within grade increases and revised staffing levels at Headquarters and the Field (+1,638)	-1,369
Travel	
■ Decrease is due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Measures Programs to the Office of Nonproliferation and National Security (-170) and adjustments for escalation (+4)	-166
Support Services	
■ FY 1999 support services funding level does not include a $2.15 million pending reprogramming request. FY 2000 support services contracting plans are based on reprogramming request funding level	+2,150
Other Related Expenses	
■ Decrease due to the reorganization and reassignment of the International Nuclear Safety and Highly Enriched Uranium Transparency Programs to the Office of Nonproliferation and National Security (-281), reductions in Operations Offices projected requirements (-114), and adjustments for escalation in Headquarters Working Capital Fund expenses (+40)	-355
Total, Program Direction	+260

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Feasibility of Design Considerations	0	800	1,150	+350	+4.4%
Economic and Environmental Analysis	0	485	1,300	+815	+168.0%
Test and Evaluation Studies	300	1,183	1,583	+400	+33.8%
Total, Technical Support Services	300	2,468	4,033	+1,565	+63.4%
Management Support Services					
Management Studies	0	0	500	+500	+100.0%
ADP Support	0	517	542	+25	+4.8%
Administrative Support Services	214	715	775	+60	+8.4%
Total, Management Support Services	214	1,232	1,817	+585	+47.5%
Total, Support Services	514	3,700	5,850	+2,150	+58.1%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	1,425	1,535	1,350	-185	-12.1%
ADP/TeleVideo Hardware and Software	325	325	325	0	0.0%
Subscriptions/Publications	40	40	30	-10	-25.0%
Training	80	80	64	-24	-30.0%
Departmental Administrative Fee	125	125	125	0	0 0%
Other Miscellaneous	548	702	568	-134	-19.1%
Office Logistical Support	40	50	40	-10	-20.%
Total, Other Related Expenses	2,583	2,857	2,502	-355	-12.4%

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Environment, Safety and Health

Executive Budget Summary

Mission

The Office of Environment, Safety and Health (EH) is committed to protection of Department of Energy (DOE) workers, the public, and the environment. This commitment is demonstrated by continuous improvement in program and policy development; independent oversight of the status of environment, safety, health, and safeguards and security programs; and sharing of technical resources, assistance and information. EH applies its resources to DOE activities in order to prevent accidents or injuries to workers and the public, and harm to the environment. EH is the Department's major source of expertise in disciplines such as environmental protection, nuclear safety engineering, public health, industrial hygiene, radiation protection, construction safety, epidemiology, and occupational medicine. The EH goal is to leverage resources and skilled personnel to efficiently provide DOE's line management programs with the tools and independent program assessments required to preserve safety and to effectively protect national security interests at DOE sites. Open communication, participation, and performance feedback on EH activities are integral to EH's success.

The Environment, Safety and Health program is funded in three appropriations: (1) Energy Supply, (2) Other Defense Activities, and (3) Defense Environmental Restoration and Waste Management. The Energy Supply EH program consists of: Technical Assistance, National Environmental Policy Act (NEPA), Management and Administration, and a Program Direction decision unit which includes the EH Working Capital Fund. The Other Defense Activities EH program includes: Oversight, Domestic and International Health Studies programs, Radiation Effects Research Foundation (RERF) program, and a Program Direction decision unit. In addition, the Defense Environmental Restoration and Waste Management appropriation supports an additional increment of health studies at sites where the Department's Environmental Management program conducts cleanup.

DOE has transitioned to new missions which include weapons dismantlement, environmental cleanup, and facility decontamination and decommissioning. Residual hazards at DOE facilities, especially in the nuclear weapons complex, are the result of more than 50 years of nuclear materials production and processing under less than optimum conditions, the impacts of which are still being characterized. DOE harbors the largest inventory of hazardous nuclear materials in the world outside of the former Soviet Union, as well as large quantities of hazardous chemicals. Due in large part to the sudden end of the Cold War, and the resultant rapid shutdown of the production and processing facilities, much of this material (including plutonium, spent nuclear fuel, highly enriched uranium, radioactive waste, radioactive isotopes, and hazardous chemicals) is stored in aging and deteriorating facilities, and under conditions that are in themselves hazardous. There is still a lack of reliable data for many of these facilities on the most basic safety issues, such as non-compliant electrical and ventilation systems. In addition to these challenges, the problem of secure storage of special nuclear material and classified information remains.

The EH mission is one of DOE's highest priorities. EH technical experts work with line program managers to develop tools needed to manage environment, health, and safety at DOE facilities more effectively and at less cost to taxpayers. EH has demonstrated that the Department can do its work better,

more safely, and at less cost by integrating environment, health, and safety into the planning and execution of work. EH will continue to work with its partners in the field to ensure that safety is no longer viewed as an "add-on" that produces only paper and needless cost, but as an asset that allows efficient targeting of the most urgent risks, most efficient use of limited resources, and effective accomplishment of work.

The need for effective programs to identify environment, safety, and health concerns at the project and individual activity level remains critical. Emphasis has been placed on assuring that prior commitments to fund programs to reduce environment, safety, and health concerns are met represent important accomplishments, but more remains to be done. The downsizing and realignment of the weapons production efforts will necessitate changes in the conduct of operations. In addition, the limitations on funding Environmental Management work as needs increase will create conflicts between meeting details of compliance agreements negotiated in earlier years and organizing efforts to pursue an integrated approach to risk reduction. EH's analytical products are shared DOE-wide to assist the sites in appropriate and timely resolution of identified and emerging environment, safety, and health concerns.

Mission Supporting Goals and Objectives

The EH overall major goals and objectives are as follows:

- Provide a standardized corporate independent oversight process to appraise the effectiveness of environment, safety, health and safeguards and security programs throughout DOE. To accomplish the goal of corporate independent oversight, the following objectives have been established: (1) identify, prioritize, and target Departmental needs for independent oversight; (2) incorporate DOE's guiding integrated safety management policy and principles into all oversight activities; (3) sustain a coordinated and consistent independent oversight for DOE; (4) administer an enforcement program that appropriately penalizes significant violations of nuclear safety requirements; and (5) disseminate lessons learned to reinforce good practices.
- Provide quality, timely, efficient, and effective corporate support and technical services. To accomplish this goal, the following objectives have been established: (1) provide Departmental environment, safety, and health crosscutting programs and technical services that are aligned with critical missions and integral to mission accomplishment; (2) evaluate operational performance data and identify for corporate assessment and action those vulnerabilities that pose urgent risks to DOE workers, the public, and mission accomplishment; (3) continue ongoing partnerships with private industry, government agencies, and national safety organizations to promote information exchange and program benchmarking to enhance DOE safety programs; and (4) improve corporate services through feedback and performance measures.
- Provide Departmental requirements, guidance, and policy for environment, safety and health program implementation and measurement. To accomplish this goal, the following objectives have been developed: (1) support ongoing field analysis, interpretation, and application of "WorkSmart" standards (safety guidelines) and provide needed regulatory interpretations and implementation guidance; (2) interface with outside regulators and provide comments on pending regulations pertinent to DOE and regulatory policies and actions having impact on DOE missions; (3) continue stewardship and improve effectiveness of the new environment, safety,

and health orders; and (4) develop, issue, and implement technical standards for DOE activities based on appropriate consensus standards.

- Provide a National Environmental Policy Act (NEPA) process that fosters sound Departmental planning and decision-making and builds public trust through effective process implementation. To accomplish this goal, EH has established the following objectives: (1) ensure timely and adequate completion of NEPA reviews through technical assistance, independent policy review, and approval recommendations for major programmatic environmental impact statements (EISs), site-wide and other EISs, and related NEPA documents; (2) ensure the consistency and quality of NEPA documents and increase the efficiency of NEPA personnel by determining and responding to customer needs; (3) issue guidance on selected technical and policy topics; (4) conduct workshops for Headquarters and field personnel; and (5) participate in NEPA process improvement teams and other initiatives that foster continuing improvement in the NEPA process.
- Ensure environment, safety, and health performance and management accountability. To accomplish this goal, EH has established the following objectives: (1) develop and support implementation of DOE-wide environment, safety, and health budget and planning process that defines scope, identifies costs, prioritizes activities based on relative risk, and allocates resources based on established commitments in a visible manner for implementation of environment, safety, and health program activities; (2) improve environment, safety, and health performance through the application of total quality approaches to management processes; and (3) integrate environment, safety, and health in all Departmental business functions.
- Support realignment of contract terms and conditions to incorporate environment, safety, and health management systems development needed to move towards a corporate business performance mode. To accomplish this goal, EH has established the following objectives: (1) identify ways for line program management to improve environment, safety, and health performance as part of work execution systems; and (2) integrate environment, safety, and health in all Departmental business functions.
- Conduct EH's mission in an open, trustworthy and responsive manner. To accomplish this goal, EH's objectives are: (1) establish and implement programs that strengthen the public's trust, confidence, credibility and respect in and for EH; and (2) support the Department's efforts to reduce the volume of national security information and minimize future classification.
- Promote the health and safety of DOE's workers and communities surrounding Departmental sites and reduce radiation and hazardous exposure through understanding of radiation effects and other hazards on humans. To accomplish this goal, EH's objectives are: (1) assist the field in the identification and application of effective approaches to prevent injury and illness; and (2) support the development of domestic and international health effects information on populations exposed to releases of varying levels of ionizing radiation.

The legal requirements that affect the activities of the EH organization include all environmental, safety, and health Federal regulations, as well as legislation such as the Atomic Energy Act of 1954, as amended, and the National Defense Authorization Act for Fiscal Year 1995.

Strategy

The Office of Environment, Safety and Health's (EH) intent is to assure that quality, objectivity, responsiveness and innovation are hallmarks of all EH activities.

EH's commitment to ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Department activities is our strategic objective, part of our performance agreement with the President, and a key part of the DOE Strategic Plan. To accomplish this objective, EH integrates and embeds sound environment, safety, and health management practices into the performance of DOE's day-to-day work. EH ensures that environment, safety and health priorities are clearly identified and given appropriate consideration for funding. EH is working with the Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) to evaluate the costs and benefits of external regulation of DOE safety and health activities. Pilot programs are being conducted.

Another strategic objective is to continually work with the public community in an open, frank, and constructive manner as a good neighbor and public partner. To accomplish this objective, EH fosters strong partnerships with neighboring DOE communities, regulators, and other stakeholders to determine priorities and solutions. In addition, EH increases public awareness of DOE's mission by improving the quality, timeliness, frequency, and sufficiency of information disseminated on the Department's functions, successes, lessons learned and future activities. EH focuses on developing management-level analytical products, reducing redundancies, and enhancing staff development. EH serves its principal customers in the following major areas: (1) development of Departmental environment, safety, and health requirements, guidance and interpretations that are effective and efficient to guide program implementation; (2) improvement of environment, safety and health performance and management accountability by supporting the integration of environment, safety, and health considerations into the Department's business and budget planning processes; (3) provision of critical corporate environment, safety and health support and services, including regulatory and industry interface, technical assistance to improve program management and execution, and to assist in the efficient and effective implementation of requirements; and (4) conduct independent oversight activities that provide a comprehensive status of environment, safety, health, and safeguards and security performance at DOE facilities.

One of DOE's greatest challenge is performing new types of hazardous work safely and securely at facilities that were designed to meet the requirements of outdated rules and orders. Many old, poorly-maintained facilities do not meet current building codes and safety standards. WorkSmart standards provide a graded approach to developing safety standards that allow the Department to tailor the standards to the work and the facilities. Pilot applications of this process indicate that worker safety can be enhanced while program costs are reduced.

The EH independent oversight program has been extremely useful in helping the Department effectively identify and target unacceptable risk. Comprehensive environment, safety and health evaluations provide DOE management with validated, professional appraisals of the site's performance by identifying areas of greatest risk in terms of both immediate hazards and overall program management. The foundation of this approach is an assessment of management effectiveness based on DOE's integrated safety management policy and the guiding principles of safety management contained in that policy. These assessments supply DOE management with validated, professional appraisals of the site's performance.

Using the guiding principles of safety management permits objective program analysis. Although much effort remains, changes in the Department's ability to apply resources to areas of greatest need have already been observed, and will become increasingly evident in efficiency in addressing environment, safety, health, and safeguards and security issues.

The rapid transition of the Department to a business management model with its emphasis on gaining cost-efficiencies, privatization and innovative management structures in the field has brought concomitant changes in how EH functions. Special emphasis will be given to self-assessment and self-reporting by field elements as a source of performance information, coupled with increased emphasis on EH performance analysis. Likewise, increased priority will be given to help move DOE line management from outdated environment, safety and health management approaches and systems to programs that facilitate the exchange of innovative business or environment, safety and health management practices that are preventive and cost-efficient in nature. From a technical safety assistance perspective, special emphasis will be given to urgent programmatic needs such as safely managing the decommissioning and decontamination of aging DOE facilities and hazardous waste.

EH will continue to build on its strong record of cutting costs without risking the safety and health of DOE workers, the quality of the environment, or the quality of the health studies program. Even as challenges have grown, the EH budget has been reduced by cutting administrative overhead costs and focusing on the highest priority needs. An EH staffing plan has identified the most critical functions and closely matched personnel to fit those needs. Functions of lower priority will continue to be eliminated. This will result in a cut in Federal personnel from 375 in FY 1998 to 355 in FY 1999 with 345 full-time-equivalents in FY 2000. EH has also analyzed how it utilizes support contractors and established specific criteria for their limited use. While EH has some unique national-level experts, technical contractual services continues to be more practical and cost-effective, providing a surge pool of technical expertise on an as needed basis. The evolving needs for national-level expertise in a multitude of disciplines can best be met through the use of contractors who can rapidly respond to the continually changing skill mix required of EH activities across the DOE complex.

The medical surveillance for the former workers program, required by the 1993 Defense Authorization Act, could potentially cost hundreds of millions of dollars. EH has worked during the past three years to develop a cost-effective approach that relies on feasibility studies to target populations most at risk. In FY 1996, EH awarded contracts to six consortia of universities, labor unions, and health specialists. In FY 1997, each of these consortia began conducting the feasibility assessment phases of their projects. In addition, EH issued a request for proposals for major sites not addressed as part of the first solicitation. In FY 1998, the medical surveillance phase of the first set of projects began, and the feasibility assessments for the four newly awarded cooperative agreements were initiated. In FY 1999, all ten projects will be in the implementation phase of their medical surveillance programs.

DOE, in partnership with the Department of Health and Human Services (HHS), has begun a process that will produce a strategy to include a public health agenda for each DOE site. Developed in coordination with HHS, this strategy will have clearly defined goals, objectives, and priorities for health activities to ensure that the issues of greatest concern to DOE workers and communities are addressed. All newly-funded health activities conducted by HHS will be consistent with the priorities established in this strategy.

In the Defense Environmental Restoration and Waste Management Appropriation, DOE supports public health studies in conducting a range of health-related activities. These activities are managed by EH and will be included in the public health agenda being developed in partnership with HHS.

Major Changes

The Department has consolidated the management of Health Studies in the Office of Environment, Safety and Health to provide a focal point for ensuring that the results of these efforts are used for the maximum benefit of DOE workers and communities.

The Department funds a large number and wide variety of epidemiologic and other health-related activities to address the potential effects of DOE operations on the health of DOE workers and communities. Through a Memorandum of Understanding with the Department of Health and Human Services (HHS), studies of worker and community health are funded through the Office of Environment, Safety and Health under the Other Defense Activities account, and are administered by the HHS/CDC. Prior to FY 1999, similar activities were separately funded by the Office of Environmental Management under the Defense Environmental Restoration and Waste Management Appropriation, and were independently conducted by HHS under its statutory authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Management of all HHS health studies (conducted by both CDC and ATSDR) was consolidated under EH in FY 1999.

The funding request for Public Health Activities in the Defense Environmental Restoration and Waste Management Appropriation for Fiscal Year 2000 is $20,000,000. These studies have been transferred by the Congress for the Office of Environment, Safety and Health to manage. This request could include funding for the Hanford Medical Monitoring Program and the Iodine-131 Exposure Registry, should they be incorporated into the DOE/HHS public health agenda for Hanford and base Public Health program activities at DOE sites. Should the medical monitoring program or exposure registry not be included in the Hanford health agenda for FY 2000 or be modified from current proposals, the Department will submit an appropriate Reprogramming Request.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Energy Supply					
Operating Expenses					
Technical Assistance	21,444	16,445	0	16,445	16,445
NEPA	3,000	2,552	0	2,552	2,500
Management and Administration	17,274	13,003	0	13,003	12,807
Program Direction	23,550	18,398	0	18,398	18,998
Subtotal, Energy Supply	65,268	50,398	0	50,398	50,750
Use of prior year balances	-1,897	0	-2,970	-2,970	0
Subtotal, Energy Supply	63,371	50,398	-2,970	47,428	50,750
Other Defense Activities					
Operating Expenses					
Oversight	14,015	11,700	0	11,700	12,775
RERF	14,000	14,000	0	14,000	13,500
Health Studies	45,985	41,031	0	41,031	40,956
Program Direction	20,000	24,769	0	24,769	24,769
Subtotal, Other Defense Activities	94,000	91,500	0	91,500	92,000
Use of prior year balances	-476	0	-2,108	-2,108	0
Subtotal, Other Defense Activities	93,524	91,500	-2,108	89,392	92,000
Defense Environmental Restoration and Waste Management					
Operating Expenses					
Public Health Activities[a]	0	12,000	0	12,000	20,000
Total, Environment, Safety and Health	156,895	153,898	-5,078[b]	148,820	162,750

[a]Public Health Activities funded in the Defense Environmental Restoration and Waste Management Appropriation were transferred by the Congress from EM for EH to manage in FY 1999.

[b]Allocated share of the congressionally prescribed general reductions in the Energy Supply and Other Defense Activities Appropriations to be taken from uncosted balances.

Staffing Profile

	(Whole FTEs)		
	FY 1998 Comparable Appropriation	FY 1999 Budget Request	FY 2000 Request
Full-Time-Equivalents			
Energy Supply	175	129	124
Other Defense Activities	200	226	221
Total, Full-Time-Equivalents	375	355	345

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	270	270	270	0	0.0%
Pantex	150	150	150	0	0.0%
Sandia National Laboratories	365	345	345	0	0.0%
Albuquerque Operations Office	113	65	65	0	0.0%
Total, Albuquerque Operations Office	898	830	830	0	0.0%
Chicago Operations Office					
Argonne National Laboratory	1,000	680	680	0	0.0%
Brookhaven National Laboratory	2,615	2,565	2,565	0	0.0%
Chicago Operations Office	1,748	2,050	2,050	0	0.0%
Total, Chicago Operations Office	5,363	5,295	5,295	0	0.0%
Idaho Operations Office					
Idaho National Engineering & Env Laboratory	300	300	300	0	0.0%
Radiological & Environmental Sciences Laboratory	1,400	1,400	1,400	0	0.0%
Idaho Operations Office	1,700	1,700	1,700	0	0.0%
Total, Idaho Operations Office	3,400	3,400	3,400	0	0.0%
Nevada Operations Office					
Bechtel Nevada	2,410	2,410	2,410	0	0.0%
Oakland Operations Office					
Lawrence Berkeley Laboratory	550	590	590	0	0.0%
Lawrence Livermore National Laboratory	3,738	3,730	3,730	0	0.0%
Oakland Operations Office	21,575	22,975	22,993	+18	+0.1%
Total, Oakland Operations Office	25,863	27,295	27,313	+18	+0.1%
Oak Ridge Operations Office					
Lockheed Martin Energy Systems	530	495	495	0	0.0%
Oak Ridge National Laboratory	7,525	5,190	4,990	-200	-3.9%
Oak Ridge Institute for Science & Education	5,228	4,645	4,577	-68	-1.5%
Office of Scientific & Technical Information	265	255	255	0	0.0%
Oak Ridge Operations Office	1,400	0	0	0	0.0%
Total, Oak Ridge Operations Office	14,948	10,585	10,317	-268	-2.5%
Ohio Field Office					
Fluor Daniel Fernald	25	25	25	0	0.0%
Richland Operations Office					
Pacific Northwest National Laboratory	7,793	7,300	7,300	0	0.0%
Hanford Environmental Health Foundation	50	50	50	0	0.0%
Richland Operations Office	1,861	1,480	1,480	0	0.0%
Total, Richland Operations Office	9,704	8,830	8,830	0	0.0%
Rocky Flats Field Office					
Kaiser Hill Co.	1,140	1,200	1,200	0	0.0%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Rocky Flats Field Office	25	25	25	0	0.0%
Total, Rocky Flats Field Office	1,165	1,225	1,225	0	0.0%
Savannah River Operations Office	400	50	50	0	0.0%
All Other Sites					
Headquarters	95,092	93,953	103,055	+9,102	+9.7%
Subtotal, Environment, Safety and Health	159,268	153,898	162,750	+8,852	+5.8%
Use of prior year balances	-2,373	-5,078	0	+5,078	+100.0%
Total, Environment, Safety and Health	156,895	148,820	162,750	+13,930[a]	+9.4%

[a]The total change of $13,930,000 from FY 1999 to FY 2000 primarily results from: 1) an increase of $8,000,000 in the Defense EM Public Health Activities program (from $12,000,000 in FY 1999 to $20,000,000 in FY 2000) which Congress transferred from EM for EH to manage, and 2) the net effect of the FY 1999 allocated share of congressionally prescribed reductions in the Energy Supply and Other Defense Activities appropriation.

Program Performance Measures

EH places its emphasis on accident prevention and excellence in protecting worker and public safety and health and achieving effective environmental standards. Success will be measured by fewer radiological and toxicological contamination events, fewer abnormal operating events, and fewer procedural violations.

EH serves as the Departmental advocate for institutionalizing effective and integrated safety management, which focuses on the key tenets of work planning, hazard analysis and hazard control. Success is measured by the implementation of enhanced work planning systems at DOE sites.

EH incorporates the existing risk-based environment, safety, and health planning and budgeting process into all new major Management and Operating and Management and Integrating Contractors contracts scheduled for renewal. Success is measured by inclusion of environment, safety, and health provisions in 100 percent of the Management and Operating and Management and Integrating Contractors contracts.

EH supports the systematic collection, analysis, and sharing of data on worker illness and injury. Success is measured by the early detection of emerging health issues and the implementation of improved health and safety practices at DOE sites.

EH performs vulnerability studies to identify environment, safety, and health vulnerabilities across the complex. Success will be measured by the reduction of the number of unaddressed serious vulnerabilities at DOE facilities from the current several dozen to zero by the end of FY 2000.

EH's multi-disciplinary, fully integrated oversight process for environment, safety, health, and safeguards and security evaluations has matured. Oversight activities serve as a catalyst for improvement and bring significant issues to senior management's attention. Success will be measured by downward trends in previously identified issues that lead to environmental releases, occupational injury and illness and recurrence of accidents.

EH is implementing nuclear safety standards for work in progress that will provide for the health and safety of workers, the public and the environment. Success will be measured by the effectiveness in implementing and complying with these nuclear safety standards on a DOE-wide basis.

The field, contractors, and outside organizations continue to adopt EH standards. Success is measured by a decrease in lost work days due to occupational illness or injury, a decrease in the number of personnel contaminations with radionuclides, and a decrease in the number of serious accidents where policy is a root cause of the problem.

David Michaels, PhD, MPH
Assistant Secretary
Environment, Safety and Health

1/25/95
Date

Environment, Safety and Health Energy Supply

Program Mission

The Office of Environment, Safety and Health (EH) is the major source of technical talent for the Department of Energy (DOE) in the areas of nuclear facility safety, worker safety and health, environmental management, and health studies. EH has set up a Corporate Safety function to facilitate transition of safety and health from internal regulation to that of licensing and regulation of safety and health to external regulation. As DOE's independent advocate for safety and health, EH assists line management in implementing major safety assurance and environmental compliance programs, and develops policies and standards related to environment, safety and health protection. EH staff is expert in the disciplines of nuclear safety, radiation protection, environmental protection, industrial hygiene, industrial safety, public health, construction safety, and risk management. EH activities funded within the Energy Supply appropriation are concentrated into three business lines within one operating decision unit: Technical Assistance; National Environmental Policy Act (NEPA); and Management and Administration. In addition, a program direction decision unit includes a portion of EH Federal staff and the EH Working Capital Fund.

EH activities include a wide range of functions that support key Departmental missions, address emerging safety vulnerabilities, nuclear and industrial hazards, and develop improved methods of managing or implementing programs. A substantial portion of these activities are also directed at performing crosscutting DOE-wide environment, safety and health functions analogous to those performed by any corporate safety office; e.g., supporting accreditation programs for radiation protection monitoring, administering DOE's Voluntary Protection Program for enhancing safety management, and collecting and analyzing DOE-wide environment, safety and health performance data to identify adverse trends or issues and assessing corporate vulnerabilities. EH maintains close contacts with private industry, regulatory agencies, and national environment, safety and health organizations, and facilitates information exchanges between DOE line management and counterparts in the private sector. EH staff also assist DOE managers in developing improved lessons-learned strategies; planning and conducting work (Enhanced Work Planning which is an integral part of the Integrated Safety Management System); applying regulations (guidance on NRC regulation); and providing radiation protection program management. EH activities support line program efforts to prevent injuries and illnesses; establish environment, safety, and health budget priorities; advocate cost-effective environmental management; and avoid risks attendant to the often unprecedented hazards that must be managed effectively across DOE.

The activities performed by the three business lines in support of the EH mission are as follows:

Technical Assistance activities involve DOE-wide safety functions that address emerging safety vulnerabilities, significant nuclear and industrial hazards, and improved methods for managing or implementing safety programs in support of Departmental missions. Additionally, this program provides a process for advocating the Department's position on emerging environmental regulations proposed by other Federal agencies, and assures that the Department's interests are considered in the formulation of cost-effective environmental standards affecting DOE. It also supports the Department's ability to represent the national position on environmental and radiation protection issues in the international standard-setting communities. Also, support is provided to: crosscutting Department-wide functions

which ensure the quality of environment, safety and health monitoring; safety and health protection of Federal and contractor employees; programs for strengthening safety performance; communication of environment, safety and health program guidance and practices; and lessons learned, including the maintenance and operation of an operating experience database.

National Environmental Policy Act (NEPA). EH provides technical assistance to DOE line management responsible for NEPA that enhances managers' decisionmaking, builds public trust, and minimizes the cost and time for document preparation and review while maintaining quality.

Management and Administration activities provide for the centralized management and direction of EH activities and include: budget and planning; systems support; information management; technical training and professional development; and DOE-wide assistance for the environment, safety, and health business and budget planning, execution and tracking processes.

Program Goals

- Provide technical operational assistance to provide quality, timely, efficient and effective environment, safety and health programs that meet priority needs and receive high customer satisfaction.
- Provide an effective system of policies, requirements, guidance and technical standards that protect the environment and enhance public and worker safety and health.
- Facilitate the effective implementation of the NEPA process enhancing efficiency and fostering public trust.
- Advocate the Department's position on emerging environmental regulations and standards to promote cost-effective, external regulatory programs protective of human health and the environment.
- Provide health physicists, industrial hygienist, and radiation scientist resources to improve the Department's ES&H activities.
- Maintain Department-wide business and budget planning and execution processes that identify environment, safety and health vulnerabilities and enable effective line program allocation and expenditure of environment, safety and health resources to the highest risk and significant safety issues.
- Provide an integrated information management program, including an operating experience database, that enhances environment, safety and health performance.
- Improve the performance and effectiveness of the Department's workforce and contractor employees in matters related to environment, safety and health through improved safety analyses and an effective lessons learned program.
- Provide corporate interface with external regulators to facilitate transition of jurisdiction for regulation of safety and health across the DOE complex.

Program Objectives

- Provide specialized technical assistance to line management to address environment, safety and health issues; identify processes that lead to improved performance.
- Provide an exchange of operating experience data and lessons learned strategies; promote safety management through analysis.
- Identify policy, requirements, guidance and standards in existing environment, safety and health directives, and integrate component parts into a new environment, safety and health directive system, and into a standards-based safety management system.
- Develop standards and implementation tools, as needed, that promote environmental and public protection goals in a more cost-effective and timely manner.
- Ensure appropriate review of Safety Analysis Reports (SARs), risk analyses and operational analyses.
- Develop environment, safety and health contract reforms that provide incentives for quality and timely performance and encourage innovative contracting approaches.
- Ensure the completion of timely and adequate NEPA reviews; ensure the consistency and quality of NEPA documents; and increase the efficiency of the NEPA process.
- Facilitate the transfer of DOE information and concerns to external regulatory authorities in support of formulating protective, cost-effective environmental regulations, directives and standards (both national and international) that reflect the Department's interests, including optimization of limited environmental protection and pollution prevention resources.
- Ensure the timely communication of DOE-specific guidance and instruction on the interpretation and implementation of newly-promulgated external environmental regulations, directives and standards to DOE line management where knowledge of, or expertise with, new environmental requirements is limited or does not exist.
- Streamline the environmental review process.
- Support the implementation of DOE-wide environment, safety and health budget planning and execution processes to improve accountability of contractors for environment, safety and health performance.
- Improve information management by enhancing EH's ability to provide quality environment, safety and health information to the public, DOE and other stakeholders; and promote safety management through analysis.
- Lead a transition from a prescriptive compliance-based approach to safety to a performance-oriented approach that provides a standards-based, graded approach to enhance facility safety.
- Foster robust academic programs for health physicists, industrial hygienists and radiation scientists that will provide an academic resource, including minority institutes, to assist the Department in technical studies.
- Act as the corporate point of contact for external regulation of DOE sites and facilities.

- Assure that workers are protected, to the maximum extent practicable, from hazardous and radioactive materials handling and operations.
- Maintain programs that promote and recognize excellence in safety and health.
- Support programs to enhance work planning, self-assessment and Integrated Safety Management Systems.
- Provide specialized programs for orientation, guidance and standards to prepare the Department for external regulation and facilitate its smooth transition.
- Develop and facilitate safety during closure of DOE's excess facilities across the DOE complex.
- Support and improve upon the safety and health programs across the DOE complex.

Performance Measures

The performance measures related to environment, safety and health activities are both qualitative and quantitative in nature. Some performance measures are:

- Improved understanding of the health effects associated with nuclear weapons production, testing, and use within past, current, and future DOE activities.
- Reduced worker health and safety impacts; no fatalities and fewer serious injuries; fewer instances of significant worker exposures; and lower overall total exposures to radiological and toxicological materials.
- Fewer radiological and toxicological contamination events; fewer abnormal operating events; fewer procedural violations; reduced non-compliance with external environmental requirements; and increased pollution prevention.
- Improved implementation tools to enhance environmental performance and reduce compliance/non-compliance costs.
- Decreased number of serious accidents where environment, safety and health policy is a root cause of the problem.
- Creation and implementation of a methodology to validate and authenticate information published by EH.
- Issuance of an annual report on ES&H expenditures/trends, accomplishments and emerging issues.

Significant Accomplishments and Program Shifts

Significant accomplishments and program shifts are defined within the respective business line descriptions that follow.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Ongoing Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Energy Supply					
Operating Expenses					
Technical Assistance	21,444	16,445	0	16,445	16,445
NEPA	3,000	2,552	0	2,552	2,500
Management & Administration	17,274	13,003	0	13,003	12,807
Program Direction	23,550	18,398	0	18,398	18,998
Subtotal, Energy Supply	65,268	50,398	0	50,398	50,750
Use of prior year balances	-1,897	0	-2,970[a]	-2,970	0
Total, Energy Supply	63,371	50,398	-2,970	47,428	50,750

Public Law Authorization:
Public Law 95-91, "Department of Energy Organization Act"

[a]Allocated share of the congressionally prescribed reduction in the Energy Supply Appropriation to be taken from uncosted balances.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Sandia National Laboratories	180	160	160	0	0.0%
Chicago Operations Office					
Argonne National Laboratory	1,000	680	680	0	0.0%
Brookhaven National Laboratories	805	755	755	0	0.0%
Chicago Operations Office	1,248	1,450	1,450	0	0.0%
Total, Chicago Operations Office	3,053	2,885	2,885	0	0.0%
Idaho Operations Office					
Idaho National Engineering & Env. Lab.	150	150	150	0	0.0%
Radiological & Environmental Sciences Laboratory	1,400	1,400	1,400	0	0.0%
Idaho Operations Office	1,700	1,700	1,700	0	0.0%
Total, Idaho Operations Office	3,250	3,250	3,250	0	0.0%
Oakland Operations Office					
Lawrence Berkeley Laboratory	510	550	550	0	0.0%
Lawrence Livermore National Laboratory	585	530	530	0	0.0%
Oakland Operations Office	850	1,175	1,193	+18	+1.5%
Total, Oakland Operations Office	1,945	2,255	2,273	+18	+0.8%
Oak Ridge Operations Office					
Office of Scientific & Technical Information	265	255	255	0	0.0%
Oak Ridge Institute for Science & Education	2,720	2,045	1,977	-68	-3.3%
Lockheed Martin Energy Systems	530	495	495	0	0.0%
Oak Ridge National Laboratory	7,295	4,710	4,510	-200	-4.3%
Total, Oak Ridge Operations Office	10,810	7,505	7,237	-268	-3.6%
Richland Operations Office					
Pacific Northwest National Laboratory	4,180	3,480	4,080	+600	+17.2%
All Other Sites					
Headquarters	41,850	30,863	30,865	+2	0.0%
Subtotal, Energy Supply	65,268	50,398	50,750	+352	+0.7%
Use of prior year balances	-1,897	-2,970	0	+2,970	+100.0%
Total, Energy Supply	63,371	47,428	50,750	+3,322	+7.0%

Site Description

Albuquerque Operations Office

Albuquerque Operations Office is located on Kirtland Air Force Base in Albuquerque, New Mexico. The primary mission continues to be stewardship and maintenance of the nation's nuclear weapons stockpile. In addition to the national security mission, the Operations Office also devotes significant resources to restoring and improving the environmental quality of operations.

Sandia National Laboratories

Sandia National Laboratories' main laboratory is a national security laboratory located on Kirtland Air Force Base in Albuquerque, New Mexico. Sandia provides technical support in the evaluation of long term dry storage of K-Basin Spent Nuclear Fuel, taking into account the associated physical and chemical changes. Sandia also provides assistance in the development of software for radiological hazard analyses at DOE facilities.

Chicago Operations Office

Chicago Operations Office, Chicago, Illinois, is responsible for overseeing the operation of contractor-operated, multi-program laboratories such as Argonne National Laboratory and Brookhaven National Laboratory. In addition, Chicago Operations provides contractor support for EH's information management communications program including technical assistance for its local area network requirements and opportunities to develop, implement and evaluate stakeholder involvement, concepts, and processes. Chicago Operations Office also provides technical assistance in addressing methods to learn from worker error events, identify worker performance problems, and enhance worker safety behavior.

Argonne National Laboratory

Argonne National Laboratory is 25 miles southwest of Chicago's Loop. Argonne provides support in resolving the Nation's environmental, safety, and health problems and promotes environmental, safety and health stewardship. Argonne provides technical support on environmental and public protection issues, including analysis of emerging rulemakings; develops environmental guidance materials and implementation tools; develops DOE performance summaries on air resource protection; and implements Clean Air Act requirements. Argonne also provides technical expertise for water resources, and human and ecological risk assessments related to DOE releases. Argonne provides technical support on information issues and assists in managing information systems.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is located in Upton, New York on Long Island. As a non-defense research institution, BNL is dedicated to basic and applied investigation in a multitude of scientific disciplines. BNL provides technical support in the development of tools, case studies, and analyses related to radiation protection issues with particular emphasis on the ALARA (as low as

reasonably achievable) process. BNL also provides technical support in conducting reviews of safety analysis and risk assessment documents such as Environmental Assessments (EA), Environmental Impact Statements (EIS), Safety Analysis Reports (SAR), and Basis for Interim Operations (BIO). BNL provides technical support in the development of rules, orders, safety guides, and standards. These documents may include Safety Analysis Reports, technical safety requirements, waste disposal standards, and fire protection standards. BNL provides technical assistance for the Enhanced Work Planning program by implementing its Onsite Technical Assistance Program in the area of enhanced work planning and control.

Idaho Operations Office

Idaho Operations Office, Idaho Falls, Idaho, uses applied engineering to clean up the cold war legacy, execute multi-program missions, and leverage the Idaho National Engineering and Environmental Laboratory's expertise with emerging technology to meet the Nation's needs. In addition, Idaho Operations Office supports EH's technical information system by providing data collection and systems development support.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) is located 44 miles outside of Idaho Falls, Idaho. Lockheed Martin Idaho Technologies Company, as the prime contractor, provides technical support for information systems which includes maintaining the Occurrence Reporting and Processing System (ORPS) for use by DOE complex-wide. INEEL reviews policy and/or guidance documents that foster improvements in both performance and cost effectiveness of DOE's construction safety and hoisting and rigging programs.

Radiological and Environmental Science Laboratory

Radiological and Environmental Science Laboratory (RESL), Idaho Falls, Idaho, focuses primarily on analytical chemistry, radiation protection, and environment, safety and health activities. RESL supports the DOE Laboratory Accreditation Program (DOELAP) by administering the performance evaluation program for personnel dosimetry systems and acts as the performance testing laboratory. RESL receives applications, conducts test sessions, coordinates on-site assessments, and recommends accreditation as appropriate.

Oakland Operations Office

Oakland Operations Office, Oakland, California, is distinguished by its multi-program expertise in the following areas: national security; environment, safety and health; and biomedical/environmental sciences. The Oakland core competencies to support the success of these programs include: program/project execution; laboratory contract management; environment, safety, health and safeguards and security oversight; and business operations support. Oakland provides grant assistance for Fellowship Programs in areas such as radiation science, health physics.

Lawrence Berkeley Laboratory

Lawrence Berkeley Laboratory, Berkeley, California, pursues basic and applied research that advances the frontiers of science and solves a broad spectrum of national problems. It is a multi-program laboratory that serves the Nation's needs in technologies and environment, safety and health activities.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is located in California's Tri-Valley region east of San Francisco. Lawrence Livermore conducts research in the national interest in the areas of advanced defense technologies, energy, environment, biosciences and basic sciences. LLNL also provides assistance in the development of rules, orders, guides and standards relating to safety at DOE nuclear facilities.

Oak Ridge Operations Office

Oak Ridge Operations Office, Oak Ridge, Tennessee, is responsible for research and development, defense programs, environmental management, and environment, safety and health activities. There are three major plant complexes on the Oak Ridge Reservation: Oak Ridge National Laboratory; Y-12 Plant; and the East Tennessee Technology Park, as well as the Oak Ridge Institute for Science and Education and the American Museum of Science and Energy. Together, these facilities represent a technological and educational resource and a major component of the East Tennessee Technology Corridor.

Office of Scientific and Technical Information

Office of Scientific and Technical Information (OSTI), Oak Ridge, Tennessee, is responsible for leading the Department's Technical Information Management Program and for providing direction and coordination for the dissemination of scientific and technical information. OSTI maintains technical information and DOE reports that EH staff access through OSTI.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE), Oak Ridge, Tennessee, is a Department of Energy facility managed and operated by Oak Ridge Associated Universities. With a diverse array of complementary, and often unique programs, they are a resource for science education programs, emergency preparedness and response, radiological site characterization and other integrated scientific and technical expertise. ORISE provides grant assistance for Industrial Hygiene, Health Physics, and minority fellowships program awards.

Lockheed Martin Energy Systems

Lockheed Martin Energy Systems (LMES), Oak Ridge, Tennessee, carries out environmental management and restoration, environment, safety and health activities, manufacturing technologies, and other activities of national importance. LMES provides technical support and analysis on environmental protection issues associated with cultural resource management, water resource protection, and ecological resource protection including: analysis of emerging rulemakings, hazardous waste management, environmental restoration emerging rulemakings, and the development of environmental

guidance materials. LMES provides technical support in radiological characterization, interagency radiological site assessment, radiological dosimetry and risk analyses for public and environmental protection, and development of radiological guidance materials to convey regulatory requirements. LMES performs technical reviews of documents prepared in compliance with the National Environmental Policy Act (NEPA). They also provide analysis and assistance in preparing NEPA guidance documents. LMES provides technical support in the operations of the DOE Technical Standards Program. In addition, they also provide safety management, computer capabilities, technical editing, and related expertise to assist with the management of DOE Safety Programs in the areas of electrical safety and fire protection.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL), Roane County, Tennessee, is a multi-program science and technology laboratory. Scientists and engineers at the laboratory participate and support environment, safety, and health activities; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. ORNL provides technical expertise required to maintain safety methods capability available to all DOE criticality safety activities. ORNL provides assistance in the development and maintenance of criticality requirements and standards. ORNL also provides technical support in collecting, analyzing, and reporting environment, safety, and health requirements and budget requests to ensure that high priority projects are addressed during the budget process. The laboratory provides technical support in the development of risk-based, integrated worker safety programs through the development of various technical standards and guides, workshops, and training material. ORNL also assists in the DOE Voluntary Protection Program which is designed to provide a vehicle for DOE to recognize excellence in safety and health programs at its contractor facilities. The laboratory provides technical support to the Federal Employee Occupational Safety and Health (FEOSH) program in the development and implementation of the FEOSH program. ORNL also provides technical assistance in implementing the EH Onsite Technical Assistance Program.

Richland Operations Office

Richland Operations Office, Richland, Washington, manages waste products; develops, applies, and commercializes technologies; manages environment, safety and health activities; and supports cleanup and environmental restoration.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL), Richland, Washington, develops and delivers new and effective environment, safety and health technologies. PNNL provides technical support on environmental and public protection issues, including analysis of emerging rulemakings, development of environmental guidance materials and implementation tools. This technical support includes development of DOE performance summaries on air resource protection and implementation of Clean Air Act requirements, water resources, and human and ecological risk assessment related to DOE releases. PNNL provides technical expertise in all aspects of radiological operations at DOE sites with Radiological Control Programs. This expertise involves radiological evaluations that monitor radiological practices, processes, and systems across the DOE complex.

PNNL provides technical support for the DOE Chemical Safety Program. Technical support is provided for health physics in the development of implementation guides, technical standards and technical solutions of specific radiological control problems. PNNL supports the development and implementation of the DOE Laboratory Accreditation Program, as well as the Voluntary Protection Program, Enhanced Work Planning, Federal Employee Occupational Safety and Health Program and other overall safety programs.

All Other Sites - Headquarters (Includes Commercial Contracts, Other Federal Agencies, and Universities)

Contractors provide:

- Technical and analytical support services relative to the implementation of and compliance with environmental statutes and regulations. Contractors provide technical support in the preparation of environmental guidance materials for DOE Headquarters program offices and DOE field organizations, and for document preparation in response to requirements of the National Environmental Policy Act (NEPA), DOE Orders and regulations pertinent to the Department. This includes reviewing environmental regulations and legislation to determine impact on DOE's NEPA compliance process and evaluating the effectiveness of DOE initiated reforms to improve its implementation of NEPA.
- Technical support for the Performance Indicator Program. They gather, analyze, trend, and report data to enhance the utility of the environment, safety and health reports presented to DOE senior management. They provide technical support in analyzing safety issues and concerns across the DOE complex. This includes support for various vulnerability studies such as the Spent Nuclear Fuel Study. They provide technical assistance in developing practical, cost-effective approaches and strategies for integrating environment, safety and health aspects into the decontamination and decommissioning projects at DOE sites.
- Technical support in the development and publication of an Operating Experience Weekly Summary to improve safety throughout DOE by applying lessons learned from previous occurrences. In addition, technical and analytical services are provided relative to EH information systems, computer support and video-teleconferencing. Technical support is also provided for the fellowship and faculty awards.
- Technical support and assistance in: analyzing results from technical support and assistance projects, and sharing lessons learned throughout the DOE complex to accelerate effective implementation of Integrated Safety Management; providing qualified safety and health professionals to perform research on questions delivered by DOE Response Line personnel; and providing technical assistance and support on matters relating to rulemaking activities.

The U.S. Department of Transportation/Volpe Systems provides technical support to the Aviation Safety program. Contractual support is provided as needed on a variety of tasks such as Information Outreach and Communication Outreach. The National Institute of Standards and Technology provides technical support for the DOE Laboratory Accreditation Program for Radiobioassay.

Technical Assistance

Mission Supporting Goals and Objectives

Technical Assistance has two fundamental goals: improving worker and nuclear facilities safety and protecting the environment. These activities often require the development of novel analysis tools and approaches, because the nature and mix of radioactive, hazardous, and toxic materials at DOE facilities are frequently one of a kind and unique. Efforts span: the design, construction, operation, maintenance, decontamination and decommissioning (D&D) and cleanup of nuclear weapons production and research-related facilities; construction safety; work planning activities, including techniques to identify, evaluate, and eliminate hazards; and identification of technologies and innovative adaptations of existing practices. Policy support and technical assistance is provided to support transactions with affected external regulatory agencies and with impacted Headquarters programs and field organizations. To enhance safety, support includes assistance to line management in developing Integrated Safety Management Systems; maintaining a corporate operating experience database; promoting effective operating experience analyses; applying WorkSmart Standards, and continuing Departmental Standards Committee initiatives. To help ensure safe operation of nuclear facilities and attendant hazardous activities, EH also develops and implements nuclear and worker safety policy requirements and standards including DOE Orders, rules, guidance documents, and technical standards. In the development of nuclear and worker safety requirements and standards, the Department interacts with other industrial, governmental, and international groups. In cases where DOE has unique nuclear conditions or hazards, particularly those involved in weapons production, DOE develops and applies its own DOE Technical Standards. These activities involve operation of the technical standards program in compliance with the National Technology Transfer and Advancement Act of 1995. EH develops and issues environmental policy to implement new legislation, regulations, or Executive Orders, or to otherwise protect the public and the environment when a deficiency in programs or operations is identified.

EH also serves as the central Departmental coordinating point for advocating the Department's position on external environmental regulations, directives and standards proposed by other Federal agencies. The primary purpose of this corporate activity is to assure the Department's interests are reflected in the formulation of protective, cost-effective environmental requirements applicable to DOE facilities and operations. This corporate activity is accomplished by tracking emerging rulemakings proposed under the authority of several key environmental laws, such as the Clean Air Act, Clean Water and Safe Drinking Water Acts, Comprehensive Environmental Response, Compensation and Liability Act, Emergency Planning and Community Right-to-Know Act, Atomic Energy Act and Resource Conservation and Recovery Act. The views of all of the Department's Program Offices and Field Organizations are solicited and considered with regard to a proposed rule and to the development of a consolidated Departmental response based on an internal analysis of the proposal and all comments received. Direct coordination with affected DOE elements is also conducted to ensure the formulation of an independent corporate position that best reflects the needs and interests of the entire complex. This DOE corporate position frequently considers, or is common to, energy sector and industry needs. In addition, this program supports the development of guidance and instruction for DOE line management to follow on the compliant interpretation and cost-effective implementation of new environmental requirements being promulgated by external regulatory agencies under the authority of the

aforementioned laws. This guidance and instruction provides the Department with tools for implementing public and environmental protection goals in a manner that helps optimize time, cost and compliance considerations. The program also consists of mandatory corporate environmental reporting, and participation on numerous intra-and inter-agency and international working groups, committees and organizations as the Departmental representative on environmental and radiation protection issues. EH acts as the corporate interface with the Occupational Safety and Health Administration (OSHA) where DOE has privatized facilities, and acts as their corporate interface with the Nuclear Regulatory Commission (NRC) where radiation protection or nuclear facility safety questions arise with respect to external regulation activities.

Significant Accomplishments

- Specialized technical assistance is provided to help line managers: develop site or facility-specific disposition plans; resolve nuclear safety issues evolving from decontamination and decommissioning (D&D) activities; work to ensure the safety of D&D workers from radiation and toxic exposure; and apply lessons-learned and good practices used by industry, the NRC and the International Atomic Energy Agency. During FY 1998, the program participated in the development of DOE Standard 1120-980, "Integration of Environment, Safety and Health into Facility Disposition Activities," and developed training sessions to implement this standard. During FY 1999, assistance is provided to implement this standard and to develop criteria for transitioning facilities at the end of a mission. (FY98: $200; FY99: $80; FY00: $80)

- Specialized technical support is provided to program and field offices as they implement Integrated Safety Management (ISM). ISM implementation is accomplished by using appropriate standards to ensure adequate protection for workers, the public and the environment against the hazards associated with facility operations. The ISM process implementation programs are underway at all DOE sites. Specifically, specialized assistance is being provided to the Tank Waste Remediation System (TWRS) Privatization and K-Basin Spent Nuclear Fuel stabilization projects at Hanford, and the Advanced Mixed Wastes Treatment Project at Idaho site during FY 1998 and FY 1999. (FY98: $200; FY99: $140; FY00: $140)

- Three DOE-wide assessments have helped DOE management better understand the condition and safety of spent nuclear fuel, plutonium, and highly enriched uranium stored at DOE sites across the nation. Although line management developed action plans to correct vulnerabilities found by the assessments, significant numbers of vulnerabilities remain uncorrected, and line management has had difficulty in tracking the status of corrective actions. EH is providing an independent compilation and evaluation of the status of the 560 vulnerabilities and their corrective actions. During FY 1998, an approach and a database for tracking and evaluating the vulnerabilities was established. During FY 1999, independent status reports on vulnerability resolution is being performed. (FY98: $300; FY99: $191; FY00: $191)

- EH evaluates and recommends new nuclear material technologies to improve the safety of tritium gas handling, plutonium nuclear materials packaging and storage, waste vitrification and stabilization and spent nuclear fuel processing. During FY 1998, significant expert technical support was provided in the preparation of a highly enriched uranium storage standard, and in the evaluation of a mixed oxide (MOX) fuel fabrication technology, Hanford's high level waste

vitrification technology, and Idaho's Advanced Mixed Waste Treatment technology. (FY98: $150; FY99: $0; FY00: $0)

- DOE's policy is to authorize conduct of high hazard nuclear operations only after the hazards have been carefully analyzed to determine the potential for accidents and their consequences, and necessary controls are provided to prevent or mitigate them. This is documented in a Safety Analysis Report (SAR) and other reports. The quality of these reports directly affects the safe operation of a facility through implementation of the prescribed controls. This program serves as DOE's corporate center of expertise for reviewing safety and authorization documentation. During FY 1998 and FY 1999, the review of selected SARs and Basis for Interim Operations and the evaluation of authorization bases will be performed at the request of line and field offices. (FY98: $500; FY99: $300; FY00: $300)

- EH provides specialized nuclear safety engineering support to program, field, and Secretarial offices in dealing with the challenges of changing former weapons production facilities to storage and waste management activities, and in consolidating the current weapons complex at Defense program sites. This includes stabilizing nuclear materials not recycled due to production cessation; revising the authorization basis for existing facilities to convert to a standards based approach consistent with modern safety standards; implementing a new regulatory framework (external regulation initiative) for DOE nuclear facilities; dismantling nuclear weapons; and disposing/storing fissionable materials. During FY 1998 and FY 1999, technical evaluation of the Hanford Tank Waste Remediation System (TWRS) Phase I design and the K-Basin Spent Nuclear Fuel (SNF) project is being performed and technical assistance is being provided to the Fort St. Vrain SNF project for the NRC licensing process and Advanced Mixed Wastes Treatment Project. In addition, technical assistance is being provided in the nuclear criticality safety assessments at Hanford, Rocky Flats, LLNL, ANL-W and in developing the Hydroxylamine Nitrate Technical report following the chemical explosion at Hanford. (FY98: $1,400; FY99: $1,000; FY00: $1,000)

- The National Environmental Policy Act (NEPA) requires that DOE evaluate potential environmental consequences of its actions. This activity assists in the overall review of Environmental Impact Statements (EIS) and Environmental Assessments (EA) by evaluating the accident and consequence analysis parts of these NEPA documents. During FY 1998 and FY 1999, accident analysis reviews of approximately 12 selected EISs and EAs will be performed annually. (FY98: $50; FY99: $50; FY00: $50)

- DOE owns many dams and water impoundments, seven of which are classified as high or significant hazard dams according to Federal guidelines. This activity sponsors the required safety inspection of these dams by the Federal Energy Regulatory Commission using Federal Emergency Management Agency guidelines. This activity also manages DOE's Dam Safety Program in accordance with Public Law 104-303 and participates with other dam-owning Federal agencies in the Interagency Committee on Dam Safety. In addition, this activity discharges the Department's responsibility of ensuring that the nuclear aspects of NASA's space missions are performed within acceptable safety margins. During FY 1998, this activity performed inspections of DOE's dams and water impoundments to assure their safety and conducted a nuclear review of the Cassini and Mars 2001 missions. During FY 1999, this activity will perform additional

inspections of DOE's dams and water impoundments to assure their safety, and a nuclear review of the Mars 2001 and Europa missions. (FY98: $325; FY99: $275; FY00: $275)

- The Department's ability to understand and learn from events occurring at its facilities is based upon the complex-wide Occurrence Reporting and Processing System (ORPS) managed within EH's Technical Assistance program. ORPS serves the corporate need to collect ES&H data and information as the basis for notification of events, performance measurements, analyses of operations, and lessons learned. Using information obtained primarily from ORPS, EH publishes the Operating Experience Weekly Summary, a document that presents analyses of accidents or unusual events. The similarity of many activities at the various DOE sites presents opportunities to enhance performance, meet environmental, safety, and health objectives, and reduce cost through the application of lessons learned throughout the DOE complex. This activity also publishes Safety Notices which provide more in-depth information on generic or recurring significant safety problems. In addition, special analysis reports are produced periodically, aimed at improving safety in single disciplines, such as decontamination and decommissioning and electrical safety. The DOE ES&H Performance Indicator Report, published quarterly, provides senior DOE management with a concise picture of Departmental performance in relation to performance indicators. Performance measures call attention to events that have directly affected workers and the environment, focus management attention on precursors to events, and provide a means of measuring the progress of risk reduction activities. During FY 1998 and FY 1999, the ORPS (which typically processes over 3000 reports annually) will be maintained and data and information from this system will be utilized in both the lessons learned and performance measurement programs. Fifty-two issues of the Operating Experience Weekly Summary will be published and disseminated to over 4,000 subscribers, and approximately 12 Safety Notices and Special Analysis Reports will be developed and disseminated. In addition, this program will collect and analyze corporate ES&H performance data and publish the Quarterly ES&H Performance Indicator Report, and maintain a new Internet system that allows customers to perform their own analysis. (FY98: $2,311; FY99: $1,789; FY00: $1,789)
- All nuclear facilities in DOE are required by law (10 CFR 835) to establish a radiation protection program that protects workers against radiological exposures. This activity provides assistance to line managers such as guidance, communication, coordination, and technical support in the field implementation of radiation protection programs. These services are provided across DOE sites and among same-site contractor organizations, and deliver valuable information about other sites where similar issues have been addressed, paths forward have been prepared, and solutions have been found. Outside perspectives conveyed to on-site managers and workers enable them to see their programs and activities in a different light. These activities are on-going each year. (FY98: $300; FY99: $200; FY00: $200)
- This activity provides technical support to the Department's Standards Committee (DSC). The DSC, chaired by the Assistant Secretary for the Office of Environment, Safety and Health, establishes processes and criteria for standards-based planning and work at DOE facilities. Best commercial practices are evaluated and effective standards-based work practices are developed and shared across the DOE complex. The standards developed by the DSC are instrumental in providing DOE and contractor line management with the tools necessary to plan and do work faster, better, and cheaper. (FY98: $350; FY99: $325; FY00: $325)

- The Atomic Energy Act requires the Department to self-regulate in the area of nuclear safety. This activity fulfills that requirement and establishes nuclear safety policy and the technical standards necessary to ensure that contractor activities adequately protect people, property and the environment from radiation hazards. These policies and standards are developed and maintained in collaboration with other nongovernmental and governmental groups and are independently reviewed by the Defense Nuclear Facilities Safety Board. While the Department adopts nongovernment safety standards when appropriate, DOE has unique nuclear hazards and operations, such as weapons production and cleanup, that require separate DOE requirements and standards. This activity also works with the NRC in the development of its nuclear safety requirements to ensure consistency with DOE nuclear safety policy and requirements. The Technical Standards Program, managed by this program, develops and maintains consensus standards for DOE use and coordinates DOE-wide participation in national and international standards-setting organizations. This program also evaluates contractor nuclear facility and operator training programs for effectiveness in implementing and complying with applicable nuclear safety requirements. (FY98: $1,625; FY99: $1,625; FY00: $1,625)

- This activity affords protection to DOE workers, the public and the environment from a criticality accident. KENO is the software code used to perform criticality safety evaluations. In FY 1998, KENO user training and applications assistance was provided to the DOE criticality safety community. Also, technical assistance was provided in the development and maintenance of criticality requirements and standards. (FY98: $220; FY99: $220; FY00: $220)

- EH assists DOE line management in preventing exposures to hazardous and toxic materials by developing cost-effective technical and analytical solutions for use in potentially threatening conditions. FY 1999 funding will develop and implement technical applications guidance for use by the field. In FY 2000 this activity will be incorporated into the hazards analyses and communications. In FY 2000 new activities will include safety and health data collection and analysis, interpretation of significant safety and health data, and creation of newly designed analytical tools and approaches to better identify and disseminate significant worker safety and health impact information. The DOE Worker Safety and Health Response Line now included in this new activity is replacing the "Corporate Services," and is a specific service provided to help resolve uncertainties regarding interpretations of all types of pertinent regulations and DOE Orders. (FY98: $900; FY99: $492; FY00: $492)

- The Decontamination and Decommissioning Project will be folded into an EH Facility Closure Program (FCP) in FY 1999, and will become a corporate-level crosscutting effort to provide Department of Energy (DOE) line managers with expert technical regulatory analyses and technical assistance as part of our support to line programs to better ensure the safe and cost-effective closure of surplus facilities. The technical bases for facility closure requirements were previously developed through the preceding EH Decontamination and Decommissioning (D&D) project during FY 1998 and FY 1999. The FCP initiative will provide technical analysis and clarification of DOE self regulatory expectations. Additionally, the FCP will support the transition to regulatory requirements and interpretations should the DOE proceed with external regulation. Technical assistance will be in the form of workshops/meetings with DOE line and field representatives to ensure both efficiency and consistency with the process of assisting on

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specific closure requirements and regulatory interpretations. (FY98: $650; FY99: $300; FY00: $300)

- The Department uses aircraft for several missions including: transport of Defense special nuclear materials; critical site security; nuclear emergency response; aerial radiation measurement; and oil pipeline and powerline patrol. Both contracted private sector services and DOE-owned fleet aircraft are used in these services. Most of the services operate, or are on alert, 24 hours per day. Prior to developing a central office for standardization, aviation policy and technical safety assistance, DOE suffered a very high aircraft accident/incident rate. In 1991 and 1992 alone, DOE lost 12 aircraft and had 17 fatalities. Since the establishment of the Headquarters Aviation Operations Team in 1993, there has been only one accident and no fatality nor injury. The Aviation Operations team has developed and maintains a state-of-the-art accident-prevention information system which provides real-time safety information to operating field elements. In FY 1999, the Team is completing the development of a similar system which will assist with managing maintenance and fiscal information, and will produce mandated periodic reports. The development efforts end in FY 1999, and thereafter only system maintenance is necessary. The Team sends field inspectors to vendor sites to verify safety systems and standardization. These are continuing needs for FY 2000 and thereafter. Support funds for these efforts are leveraged through an interagency agreement with the Department of Transportation, Volpe National Transportation Systems Center. Volpe provides the development and maintenance support for the mission critical systems and shares the technology with other Federal agencies. Additionally, DOE shares its successes through the General Services Administration (GSA) sponsored Interagency Committee for Aviation Policy. (FY98: $350; FY99: $350; FY00: $350)
- In FY 1999, the guidance and interpretation function for the areas of construction safety will be consolidated with other specialized disciplines such as electrical and mechanical safety, fire arms safety, and fire protection that provide technical support for DOE Line Management. In FY 1998, construction safety required only nominal support in the areas of information collection and analyses, maintenance of information data bases, maintenance of documents on-line, and technical communications for these specialized disciplines. The personnel in these safety disciplines provide representation and support to national consensus bodies and advisory committees that are responsible for the development of standards, best management practices and other federal and industry-guidelines and regulations. (FY98: $300; FY99: $0; FY00: $0)
- For FY 2000, the technical assistance program will support a range of line activities, including: broad technical support, such as the guidance and interpretations function for construction safety; and other specialized technical safety disciplines, such as radiation protection, fire protection, industrial safety, industrial hygiene, and electrical safety. Personnel in these technical safety disciplines also provide representation and support to national consensus bodies and advisory committees that are responsible for the development of standards, best management practices and other Federal and industry-guidelines and regulations. Radiation protection activities provide: interpretations, amendments, and exemptions to 10 CFR 835; updated implementation guidance and technical standards; technical assistance to DOE line management on radiation protection to facilitate efficient program implementation and to support specific initiatives such as emergency response; and analysis of radiation exposures to DOE workers. (FY98: $1,200; FY99: $1,200; FY00: $1,200)

- DOE has 26 sites with significant chemical activities. Typically each site has more than 100,000 chemical containers, many of which are not fully characterized. The Department experienced a serious chemical explosion and other chemically related incidents in FY 1997, which led to the initiation of extensive review and upgrades in chemical safety practices. The upgrade initiative was initiated in FY 1998, however, activity will continue into FY 1999. A new 10-step chemical-safety improvement process has resulted in a significant overall reduction of chemical related injuries, but there remains much to be done. DOE is characterizing its legacy of chemical hazards and must address new hazards as they are identified. DOE is importing and incorporating the value-added aspects of programs of the Chemical Manufactures Association (CMA). These CMA programs include Responsible Care and best management practices of the chemical industry. This program will ensure that best practices are adapted to the special needs of each DOE site and implemented. It provides numerous opportunities for partnering among sites and between DOE and industry chemical and safety experts. The program will be extended to ensure that recent lessons learned in chemical safety are permanently captured and implemented in chemical work planning for our significant chemical operations. (FY98: $400; FY99: $500; FY00: $500)

- The Department of Energy Laboratory Accreditation Program (DOELAP) is mandated by regulation 10 CFR 835, and is similar to the Nuclear Regulatory Commission (NRC) private sector National Voluntary Laboratory Accreditation Program (NAVLAP). The DOELAP certifies each DOE facilities' ability to accurately determine a worker's exposure to radiation as measured by individual dosimeters (radiation detection badges) and radiobioassy, the analysis of urine and fecal samples to quantify the presence of any radiatioactive material inhaled or ingested by the worker. The daily operation of the DOELAP includes irradiating dosimeters and mailing them to facilities, calibration phantoms maintenance, preparation and processing of artificial urine and fecal samples, plus all the many support activities such as record maintenance and data collection. DOELAP accreditation is essential to demonstrate that worker radiation exposure is being measured accurately. A comprehensive, quality tested, internal dosimetry package will be provided to all DOE facilities for the calculation of internal radiation exposures to workers. Finally, extremity dosimetry will be incorporated into the existing whole body personnel dosimetry accreditation program, and accreditation technical standards, based upon national consensus standards, will be developed. (FY98: $2,400; FY99: $2,200; FY00: $2,200)

- The Voluntary Protection Program (VPP) is a nationally recognized program designed to encourage DOE sites to achieve excellence in their safety and health programs. VPP personnel assist sites in preparing for program participation by benchmarking DOE sites through partnering Occupational Safety and Health Administration (OSHA) VPP Star Sites from all sectors of the commercial arena with DOE sites so that DOE sites can learn and benefit from the commercial site efforts. By meeting established criteria, DOE sites can participate in the DOE/VPP program. Program participants are re-evaluated on set schedules to ensure continued adherence to program elements. The DOE-VPP Team provides direct support to field elements that are sponsoring VPP. Efforts include: utilization of specialized technical contact applications for onsite review teams; evaluation of quality control; technical assistance through its customer representative and outreach programs; coordination/networking; development of activities and materials; and interagency partner liaison. The DOE/VPP program is designed to also consider the applicant's achievements in integrated safety management. Onsite evaluations for four sites were performed

in FY 1998. In FY 1999, onsite evaluations-program assistance visits for four additional sites are expected. (FY98: $500; FY99: $500; FY00: $500)

- EH established a DOE-wide Federal Employee Occupational Safety and Health (FEOSH) program mandated by the OSH Act, DOE Order 440.1, and 29 CFR 1960. The continuing FEOSH program is prevention-oriented and provides expertise and tools to DOE line managers and field elements for developing and implementing site-specific safety and health programs for their Federal employees. The FEOSH program focus is to provide hazard intervention strategies that target particularly problematic safety and health issues. The FEOSH program also supports field elements providing specialized technical expertise not available locally; model programs that can be used for several Federal sites; and assistance in the resolution of employee safety and health concerns. (FY98: $200; FY99: $200; FY00: $200)

- Enhanced Work Planning (EWP) is a conduct of work process designed to improve worker safety and health practices which also results in improved work efficiency. The EWP principles are being applied to all work performed at DOE sites. This activity communicates EWP lessons learned among sites, and assists the field in developing a standardized approach to EWP, including work planning procedures, tools for better hazard analysis, hazard control strategies, and improved processes to target employee monitoring and identify health trends. At several DOE sites, EWP is now being implemented on a sitewide basis, and at other DOE sites, new pilots are beginning. In FY 1998, the majority of DOE sites will be implementing EWP programs, and in FY 1999, EWP will be embedded in work activities at virtually all DOE sites. In addition, the professional Federal staff have facilitated the downward trend of this program by sharing lessons learned, and sharing work planning procedures and software tools developed at EWP sites. Therefore, in FY 2000, the Department's sites should be relatively self-sufficient. (FY98: $1,700; FY99: $300; FY00: $0)

- EH provides the Defense Nuclear Facilities Safety Board (DNFSB) liaison, the primary focus of which is to serve as the transactional interface with the DNFSB. Activities to date have included development, coordination and preparation of responses to specific DNFSB recommendations, technical papers, reports, and requests for information on specific technical disciplines under the cognizance of this office which has the Departmental expertise in radiation protection and worker protection issues. In response to DNFSB Recommendation 95-2 and specific concerns by the DNFSB on safety management systems, the office conducted the Worker Protection Criteria initiative in FY 1998 to provide focus and definition for the basis of worker protection programs across the Department.The office will develop in FY 1999 model contract language and performance measures in support of DNFSB Recommendation 95-2, Integrated Safety Management Systems (ISM). The office will also develop tailored approaches to ISM implementation, collect and communicate lessons learned in ISM implementation and establish worker involvement as the eighth principle of ISM. During FY 2000, the projects will focus on moving the test protocols to site wide demonstration at selected sites. This activity will support the Department's ongoing implementation of its Integrated Safety Management Systems (ISMS) with emphasis on worker protection. (FY98: $400; FY99: $300; FY00: $1,100)

- Several preparatory activities are required to ensure the efficient transfer of regulatory jurisdiction from DOE to either OSHA, authorized states, or the Nuclear Regulatory Commission (NRC). This ongoing transitional activity requires identification, review and resolution of

significant implementation issues. Increased interactions with all potential federal external regulatory agencies was begun in FY 1997 to define the initial scope of transfer of jurisdiction from self-regulation to external regulation. Efforts are focused on four areas. The first is development of a scope and policy, which is designed to identify those fundamental organizational and structural changes that are needed to facilitate and expedite transition of jurisdiction to external regulators. The second is the matching of external regulator's existing set of regulations and policies through pilot projects, reviews and evaluations, and discussions among the various staffs. The third involves the provisions of real-time assistance and support to those field elements that are designed for intensive regulatory reviews. This will require the utilization of specialized contractor services to enhance staff capabilities which are limited in external regulatory experience. The fourth area is the development of a guidance and orientation mechanism for DOE field office/element and contractor personnel to ensure support to field and line program elements. Until DOE is regulated by external entities, DOE field offices are responsible for privatizations requiring the divestiture of properties or the investment of private capital on DOE-owned lands. Privatization support includes: resolution of safety and health jurisdictional issues; examination of safety and health issues related to "downsizing;" contract reform; privatization activities; evaluation of safety and health issues resulting from co-located privatized operations; evaluation of DOE's "landlord" responsibilities with respect to worker safety and health; maintenance of a database of DOE sites and facilities whose jurisdiction has been transferred to OSHA; independent assessment of regulatory and resource impacts; and working with the DOE legal staff to assess areas where lapses in safety oversight coverage may exist. (FY98: $1,400; FY99: $800; FY00: $1,200)

- Self-Assessment is an integral part of the Integrated Safety Management policy and program at DOE. The self-assessment module was developed in FY 1998 by EH staff, folded into the overall ISM process and pilot projects developed in the field. Improving self-assessment programs and integrating them into daily work processes and practices translates directly into cost savings as a result of improved productivity, efficiency, and safety. During FY 1999, it is anticipated that initial results from the demonstration efforts will show substantial value from testing a wide range of tools at various DOE sites. This effort will sustain the Department's ongoing implementation of Integrated Safety Management Systems at these demonstration sites. Further progression of this effort in FY 2000 will take place in conjunction with the Department's ongoing efforts to maintain a sustainable ISM system at all DOE sites and will include workshops and lessons learned conferences conducted by EH staff. (FY98; $0; FY99: $100; FY00: $0)

- Chronic beryllium disease (CBD) has been shown to be a very serious health problem at DOE defense and laboratory sites where beryllium was used. Numbers of former DOE beryllium workers have become immunologically sensitized, and others have progressed to a diagnosed disease. This activity supports a Secretarially-mandated policy for development and execution of a program for disease prevention and exposure control. The objectives are to define safety operating parameters, to establish medical surveillance programs, and to facilitate information exchange for prevention of chronic beryllium disease. This program, the Chronic Beryllium Disease Prevention Program, was initiated in FY 1997 with the efforts of a small Federal staff. In FY 1998, it focused on interim DOE Policy for exposure prevention strategies and initiated rule development on comprehensive program implementation. In FY 1999, specific activities include

resolving public comments received on the Notice of Proposed Rulemaking, published in the Federal Register in FY 1998, and publication of the Final Chronic Beryllium Disease Prevention Program rule. FY 1999 activities will also focus on interim DOE Policy to implement lessons learned that will enhance the rulemaking process and final rule. As the Policy rule will be completed in FY 1999, FY 2000 specific activities will include program implementation guidance and support, field program collaborative assistance, and expanded health surveillance. This activity will be supported by Federal staff who have developed the policy. This activity will be supported by the Federal staff who have developed the policy with the final rulemaking efforts funded in the EH Defense appropriation. (FY98: $0; FY99: $800; FY00: $0)

- Technical Assistance includes the review of environmental documents prepared by line management to verify the adequacy and validity of environmental technical information. This includes technical support on authorization of disposal sites and authorization limits for control and release of property containing residual radioactive material. (FY98: $305; FY99: $50; FY00: $50)
- The Technical Assistance also provides environmental policy advice and interpretation of DOE's rule on radiation standards and associated directives to protect the public and the environment. This includes significant increased assistance in the implementation of guidance to streamlining the approval and implementation process for controlling and releasing residual radioactive material. (FY98: $143; FY99: $50; FY00: $50)
- The program maintains up-to-date DOE-wide policy, directives, and regulations for radiation protection of the public and the environment and general environmental protection that increases the flexibility for implementing requirements in a more effective and streamlined manner, and incorporating within DOE an integrated management systems approach for environmental protection. The program also: reviews and updates environmental policies to reflect "reinventing government" concepts using an integrated management systems approach; and prepares proposed revisions to the Department's Environmental Protection Order. (FY98: $125; FY99: $100; FY00: $100)
- The Technical Assistance program provides environmental guidance, instruction and tools (e.g., regulatory bulletins, information briefs, models/codes, technical standards, management guides) to assist programs in understanding and implementing newly promulgated environmental requirements in the following areas: Clean Air Act, Clean Water and Safe Drinking Water Acts, Atomic Energy Act, Emergency Planning and Community Right-to-Know Act, cultural resource management acts, and hazardous substance release response, waste management and pollution prevention acts; and coordinates with various national and international standard-setting bodies in the development of technical standards pertinent to DOE. (FY98: $1,660; FY99: $1,200; FY00:$1,200)
- The Technical Assistance program also monitors over 200 emerging environmental rulemakings annually, and develops and represents DOE's position on proposed regulations, directives and standards to ensure that DOE's concerns are considered so as to promote efficient and cost-effective implementation of external regulatory programs complex-wide. The program completes reviews and evaluations of over 20 international and national standards and coordinate with

numerous national and international organizations on their development. (FY98: $880; FY99: $808; FY00: $808)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Assistance	21,444	16,445	16,445	0	0.0%
Total, Technical Assistance	21,444	16,445	16,445	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Technical Assistance			
■ Many of the Department's facilities are near or past their intended operational lifetime. Hazards must be evaluated and controls established before each mission change from operation to final disposition (e.g. through shutdown, deactivation, decontamination, and decommissioning). Technical assistance will be provided that is essential to implementing DOE Standard 1120-98, "Integration of Environment, Safety and Health into Facility Disposition Activities", and to implementing facility transition criteria.	200	80	80
■ Hazard and safety analysis and technical safety requirement are important and integral elements of the Department's Integrated Safety Management (ISM) process for all phases of facility operations. As the Department's corporate center of expertise in these areas, assistance will be provided to sites and facilities in implementing ISM, as needed, for facility operations and disposition activities.	200	140	140
■ Follow-up will continue, at a reduced level of funding, on line management progress to correct safety deficiencies and hazards identified by the several complex-wide vulnerability studies (e.g., Plutonium Vulnerability Study, Spent Nuclear Fuel Study, and the Highly Enriched Uranium Vulnerability Study). Although line management has developed action plans to correct the 560 vulnerabilities found in the studies, a significant number remain uncorrected and line management is having difficulty in tracking the status of corrective actions. This activity will develop an independent status report of the vulnerability corrective actions and provide assistance to corrective action projects at Idaho, Savannah River, and Hanford.	300	191	191
■ The selection and application of new nuclear material technologies significantly contributed to DOE's strategic program for nuclear materials storage and waste management activities. Support was completed in the evaluation of applicable projects at the Idaho, Savannah River, and Hanford sites.	150	0	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The analysis of potential accidents, their consequences, and the controls to prevent or mitigate them are documented in Safety Analysis Reports (SARs) and other documents. The quality and accuracy of these documents directly affect the safe operation of a facility through the implementation of the controls they prescribe. As the corporate center of expertise in reviewing these documents, assistance will be provided at a limited level in evaluating selected SARs and Basis for Interim Operations (BIOs) at the request of line and field offices	500	300	300
■ EH provides specialized engineering support to program, field and Secretarial offices in a wide spectrum of technical disciplines including nuclear criticality safety, nuclear materials technology, chemical processes, fire protection, regulatory compliance and safety assessments. This specialized engineering assistance will significantly contribute to improving the safety of facility operations throughout the DOE nuclear complex and to developing the essential elements necessary for transitioning DOE's major sites with significant quantities of nuclear waste to external regulation. In addition, a level of assistance will be provided to enhance the safety of nuclear materials and facilities stabilization and consolidation, and waste processing activities	1,400	1,000	1,000
■ EH provides expert technical review of the accident and consequence analysis of Environmental Impact Statements and Environmental Assessments evaluations with regard to the potential consequence of the activity on the public and the environment	50	50	50

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ This activity assures the safety of DOE's seven hazardous dams and impoundments by sponsoring their inspection by the Federal Energy Regulatory Commission in accordance with Public Law 104-303. The activity supports participation on the Interagency Committee on Dam Safety. In addition to this committee, this activity supports participation on the Presidentially directed Interagency Nuclear Safety Review Panel (INSRP) to ensure that NASA's space missions will not disperse plutonium on earth. Safety reviews will be performed on the upcoming Mars 2001 mission and the Europa mission to Jupiter.	325	275	275
■ This activity manages an Occurrence Reporting and Processing System (ORPS) for notifying DOE management of nuclear events occurring at DOE facilities similar to the Nuclear Regulatory Commission's system. These data are compiled and analyzed for the purpose of deriving lesson(s) to be learned to prevent recurrence of a similar event. The lessons learned are disseminated throughout the DOE nuclear community through the publication of an Operating Experience Weekly Summary. When warranted, Safety Notices are also published to provide more in-depth information on significant safety problems and on generic or recurring events. Data will also be collected and analyzed on several dozen performance indicators that highlight activities directly affecting worker safety and protection of the environment. These data will be assimilated into a quarterly Performance Indicator Report which will provide DOE management with the progress made towards improving worker safety and protection of the environment at DOE sites. System improvements are being made to ORPS, which will result in decreased funding requirements in the outyears	2,311	1,789	1,789

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ EH continues to provide specialized nuclear radiation safety expertise to line management in resolving site/facility specific radiological health and safety problems and improving the safety of workers involved with nuclear operations. Activities include providing assistance on implementing 10 CFR 835, developing appropriate radiological engineering capabilities, instituting workshops to train personnel, and integrating essential safety controls into the site's planning, scheduling, and conduct of radiological activities	300	200	200
■ EH provides technical and liaison support to the Department's Standards Committee (DSC). This support includes information systems, materials and facilities for DSC meetings, and preparing DSC reports and documents. Support is also provided in defining criteria for establishing an acceptable standards program for operating facilities and assisting line organizations in incorporating these criteria in the development of standards-based planning and work	350	325	325
■ DOE is self-regulating as required by the Atomic Energy Act and, as such, is responsible for establishing the standards to which its contractors must adhere in performing nuclear related and non-nuclear operations. This program is charged with this responsibility and creates and revises the policies and standards necessary to ensure the safety and protection of workers, the public, and the environment in the performance of facility operations. These standards are issued in the form of rules, orders, and various guidance documents, each of which is designed to improve or enhance safe and environmentally benign operations. In addition, interface is maintained with the Defense Nuclear Facilities Safety Board, the Nuclear Regulatory Commission, and other governmental and industry groups on matters concerning nuclear safety and regulation	1,625	1,625	1,625

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continued support is required to maintain a quality safety methods capability available to DOE Criticality Safety activities. KENO (software code used to perform criticality safety evaluations) user training and applications assistance must be maintained. Development and maintenance of criticality requirements and standards must be continued. Improvements of the software code (KENO) must be made in order to establish a more user-friendly nuclear criticality safety software package	220	220	220
■ Hazards analyses includes safety and health data collection and analysis, interpretation of significant safety and health data and creation of newly designed analytical tools and approaches to better identify, analyze, and disseminate significant safety and health hazard impacts to the complex. The DOE Worker Safety and Health Response Line is a specific service provided to help resolve uncertainties regarding interpretations of all types of pertinent regulations and DOE Orders. The FY 2000 funding level is a best estimate based on past experience. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.	900	492	492

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ In FY 1999, the Decontamination and Decommissioning (D&D) project will transition into the Facility Closure Program and will include the information and technical standard developed under the D&D phase of the project. The EH Facility Closure Program (FCP) is an EH corporate-level crosscutting effort to provide DOE line managers with expert technical regulatory analyses and support. This level-of-effort activity is part of our assistance to line programs to ensure the safe and cost-effective closure of surplus facilities. The basis for facility closure requirements was previously developed through the preceding EH D&D project during FY 1998 and ending in FY 1999, with that activity being transferred to the FCP initiative. The FCP initiative will provide technical analysis and clarification of DOE expectations. Additionally, the FCP is intended to support the transition to differing regulatory requirements and interpretations should DOE proceed with external regulation of these activities. Technical assistance is expected to be in the form of coordination between external regulators, regulatory analysis of site-specific requirements, workshops/meetings with DOE line and field representatives to ensure both efficiency and consistency with the process of assisting on specific closure requirements and regulatory interpretations. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	650	300	300

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The Aviation Operations Team has developed and maintains a state-of-the-art accident-prevention information system which provides real time safety information to operating field elements. In FY 1998 and FY 1999, the Team will complete the development of a system to manage operation, maintenance and fiscal information, and to produce mandated periodic reports. The development efforts and system implementation will end in FY 2000, and thereafter only system maintenance is necessary. The Team sends field inspectors to vendor sites to verify safety systems and standardization. These are continuing level-of-effort needs for FY 2000 and thereafter. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	350	350	350
■ FY 1998 was the last year in which specific funding was provided for guidance interpretation in the areas of construction safety. Beginning in FY 1999, this function has been consolidated with other specialized disciplines	300	0	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Activities include two broad based areas of support: technical services and radiation protection. Ongoing technical services include the guidance and interpretations function for the areas of construction safety, electrical safety, explosive safety, industrial hygiene, fire protection, and emergency response, which have been consolidated with other specialized technical disciplines to provide overall corporate technical support to DOE line programs. These corporate services include maintenance of technical standards, participation and representation in, and support to, national consensus bodies and advisory committees that are responsible for the development of standards providing best management practices and other Federal and industry-guidelines and regulations. Radiation protection activities focus mainly on the worker radiation protection in the DOE. These activities provide: interpretations, processing of amendments, and exemptions to 10 CFR 835, updated implementation guidance and technical standards; technical assistance to DOE line management on radiation protection to facilitate efficient program implementation and to support specific initiatives such as emergency response and analysis of radiation exposures to DOE workers. Overall reductions are minimal due to transfer of some work on the privatization initiative under external regulation. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	1,200	1,200	1,200

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Activities will focus on implementing site chemical safety management programs that are consistent and in alignment with the Department's Integrated Safety Management Systems (ISMS), in order to promote safe management of chemical hazards consistent with other hazards management programs supported by ISMS. For FY 1999, the chemical safety program will conclude the chemical safety practice upgrade initiative. This program is now at level-of-effort status and supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	400	500	500

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ This ongoing level of effort program consists of two parts: one is the DOE Laboratory Accreditation Program (DOELAP) and the Radiobioassay and Bioassay Accreditation Programs. The daily operation of the DOELAP includes irradiating dosimeters and mailing them to facilities, production of calibration phantoms, preparation and processing of artificial urine and fecal samples, record maintenance, data collection and report generation. DOELAP accreditation is essential to demonstrate to workers that their radiation exposures are being measured accurately. The DOELAP implements accreditation programs for whole body dosimetry programs, external dosimetry programs (wrist badges and finger rings) and radiobioassay laboratories. The Radiobioassay Accreditation Program and Extremity Dosimetry Accreditation Program implements recent national consensus standards and addresses quality assurance issues raised at sites across the DOE complex. A comprehensive and validated internal dosimetry package will be provided to all DOE facilities for the calculation of internal radiation exposures to workers. Finally, for radiation environments outside the scope of DOELAP (high energy neutrons at accelerator facilities and dose measurements associated with criticality accidents), intercomparison programs will be routinely modeled to identify quality issues and ensure consistency. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	2,400	2,200	2,200

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ The Voluntary Protection Program (VPP) is modelled after private industry's program and is designed to encourage DOE sites to achieve excellence in their safety and health programs. DOE staff arrange a "benchmarking" partnership between a DOE site and a commercial site that already has OSHA VPP Star status. The DOE site can then benchmark its relative standing to the Star site and learn the proven programs and processes developed and tested by the commercial partner, thus transferring what can be utilized to the DOE site. DOE has an established set of criteria which aspiring VPP participants must meet. Once DOE-Star status is achieved, participating sites are re-evaluated on pre-determined schedules to assure continued adherence to program criteria. In addition to the brokering of partnerships for learning, DOE-VPP staff evaluate and process the VPP applications, select and lead onsite review teams, evaluate applicants with onsite review teams, and maintains customer representative and outreach programs for networking. Outreach program assistance is expected to increase with additional sites entering the program. Four additional sites are anticipated for FY 2000. Funding is based on history of costs on receiving, processing, review, and approval of a VPP application. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	500	500	500

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The Federal Employee Occupational Safety and Health (FEOSH) program covers approximately 14,000 Federal employees in DOE. The FEOSH program is an ongoing, prevention-oriented program. It provides expertise and tools to DOE line managers and field elements for developing and implementing site-specific safety and health programs for their Federal employees. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.	200	200	200
■ Specific budgeting for Enhanced Work Planning is concluded in FY 1999 because it has been adopted at virtually all DOE sites	1,700	300	0
■ This transactional interface activity with the Defense Nuclear Facilities Safety Board (DNFSB) covers the work associated with response to DNFSB recommendations and Technical Positions, both of which require DOE responses and actions. With DNFSB Recommendation 95-2, "Integrated Safety Management Systems," a complex process was developed to respond to the Recommendation. This activity supports and sustains the Secretary's commitment and challenge for accelerated ongoing implementation of the Departmental ISMS. The liaison effort to provide the DNFSB interface with ISMS program management began in FY 1999 and will carry on into FY 2000. At this time innovative approaches also will be deployed across the DOE complex to "jump start" and accelerate tailored approaches to ISM. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.	400	300	1,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ External regulation transition support involves interactions with all Federal external regulatory agencies. It was begun in late FY 1997 and proceeded through FY 1998 to define the scope of issues involved in transfer of jurisdiction from self-regulation to external regulation. Efforts were focused on four areas: the first included broad scope policy, broad fundamental organizational and structural changes needed to facilitate and expedite transition of jurisdiction to external regulators; the second was the matching of external regulator's existing set of regulations and policies through pilots, reviews, evaluations, and discussions among the various staff; the third area was the development of guidance and orientation vehicles for use by field office/element and contractor personnel, and line program elements; and the fourth area is the development of a guidance and orientation mechanism for DOE field office/element and contractor personnel to ensure support to field and line program elements. EH has taken the initiative to set up a Corporate Safety function to facilitate transition of safety and health from internal regulation to that of licensing and regulation of safety and health to external regulating. Possibly a few single-purpose Science laboratories will be transitioned to external regulation in FY 2000. This effort supports the following commitment made in the Performance Agreement between the Secretary of Energy and the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities	1,400	800	1,200
■ Specific funding for Self-Assessment projects is concluded in FY 1999 and the project will be conducted by EH staff in FY 2000	0	100	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Chronic beryllium disease (CBD) is one of the very serious health problems resulting from working at DOE defense production and National Laboratory sites where beryllium was used. Numbers of former DOE beryllium workers have become immunologically sensitized, and others have progressed to a diagnosed disease. This activity supports a Secretarially-mandated policy development and execution of a disease prevention and exposure control program whose objective is to define operational safety parameters, establish improved medical surveillance programs, and facilitate information exchange for prevention of chronic beryllium disease. Activities will include program collaborative assistance, reviews and evaluations, and expanded health surveillance. This activity reflects the development of the Final Chronic Beryllium Disease Prevention Program rule. The final efforts for this rule development are funded in the EH Defense (Other Defense Activities) appropriation where the chronic beryllium disease program efforts are funded. This effort supports the following commitment made in the Performance Agreement between the Assistant Secretary for ES&H: Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.	0	800	0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Review environmental documents to verify the adequacy and validity of environmental technical information and to support implementation of streamlined and improved authorizations. Key reviews include several disposal site authorizations for DOE's low-level waste sites, and authorized limit documents for ten DOE activities. The disposal site authorizations are required for radioactive waste management, and the authorized limits result in more cost-effective and protective management of radioactive materials. Participation in these reviews is critical to the goals of improved cost-effective implementation procedure and ensuring environmental compliance. These reviews also identify needed updates to policy, guidance and program implementation tools that are needed by the field to effect program goals. Although these funds may not allow for the accomplishment of all requested reviews, they are estimated to address critical needs such as authorization reviews and analysis of annual environmental data to achieve the goals and basic performance metrics. This activity supports Strategy 1 of EH's Performance Agreement currently in effect: "Integrate and embed sound environment, safety and health management practices into the performance of DOE's day-to-day work" of the following performance objective: "Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment..."	305	50	50

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide environmental policy advice and interpretations on DOE's rule on radiation standards and associated directives to protect the public and the environment. This activity is essential to effective and consistent implementation of requirements, and appropriate use of radiation protection tools. It increases DOE-wide awareness of lessons learned, and avoids repeated and costly failures while capitalizing on success. Funding allocations are based on prior experience. Performance will be measured by the correctness and usefulness of advice given. In addition to the critical health and safety issues related to this activity (increases in radionuclide releases and doses), poor performance in this area could result in weakened DOE credibility with the public. This activity supports Strategy 1 of EH's Performance Agreement currently in effect: "Integrate and embed sound environment, safety and health management practices into the performance of DOE's day-to-day work" of the following performance objective: "Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities"	143	50	50

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Maintain up-to-date DOE-wide policy, directives and regulations for radiation protection of the public and general environmental protection. Activities include issuing rule radiation protection guidance and standards and associated directives, and updating of general DOE environmental protection policies and requirements including the Environmental Protection Order. Implementing 10 CFR Part 834, "Radiation Protection of the Public and Environment," is essential to DOE's public and environmental protection goals. It is necessary to ensure continued and improved safe operations at DOE facilities in a manner that is flexible and cost-effective. The environmental protection directives and policies included in this activity are intended to maintain within DOE an integrated systems approach for environmental protection that improves performance and reduces cost. Funding levels are based on experience from previous years and are prioritized based on an assumed funding level. Performance will be measured by the effectiveness of the improvements in policies and directives, and by the specific metric of resolving issues relating to EPA comments on Propose 10 CFR Part 834.	125	100	100

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Provide environmental guidance, instruction and tools (e.g., regulatory bulletins, information briefs, models/codes, technical standards, management guides) to assist programs in understanding and implementing newly promulgated environmental requirements in the following areas: Clean Air Act, Clean Water and Safe Drinking Water Acts, Emergency Planning and Community Right-to-Know Act, Atomic Energy Act, cultural and natural resources management acts and hazardous substance release response, waste management and pollution prevention acts. Through its work with emerging environmental regulations and Federal regulators, the Office of Environment has developed a firm understanding of regulatory requirements and an extensive working knowledge of how they affect the DOE complex and, to a certain degree, the energy section, as well as other government entities. This expertise is utilized to develop Departmental policies and guidance to assure DOE-wide understanding of newly promulgated environmental requirements, and respond to requests from DOE line management for assistance in developing cost-effective compliance strategies for new environmental regulations. These products and services help the Department meet its core value of protecting human health and the environment through the development of result oriented, cost-effective solutions. Performance will be measured by the level of success in fulfilling the commitments to improve the efficiency and effectiveness of DOE's ES&H activities articulated in the annual Performance Agreements between the Secretary of Energy and EH. This activity supports the "environment policy" component of Strategy 1 contained in the Performance Agreement currently in effect	1,660	1,200	1,200

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Monitor over 200 emerging environmental rulemakings annually, and develop and represent DOE's position on proposed regulations, directives and standards to ensure DOE's concerns are considered. Although EH's efforts focus on DOE research, development and production activity and facility needs, energy sector, as well as other Federal agency needs are frequently considered. The feedback provided to other agencies and institutions resulting from this effort promotes cost-effective, implementable regulations and standards while still ensuring protection of the public, environment and workers. It also provides feedback from field organizations to ensure that the practical aspects of proposed regulations are considered in their development. Funding levels are based on past experience, projected Federal and international regulations, directives and standards development schedules giving due consideration to anticipated legislative actions and administrative reforms. Performance will be measured by the level of success in fulfilling the commitments to improve the efficiency and effectiveness of DOE ES&H activities articulated in the annual Performance Agreements between the Secretary of Energy and EH. This activity supports the "environmental policy" component of the Strategy under the corporate management objective of the Performance Agreement currently in effect	880	808	808
Total, Technical Assistance	21,444	16,445	16,445

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Enhanced Work Planning	
■ Completion of the Enhanced Work Planning (EWP) in FY 1999	-300
Integrated Safety Management	
■ Support Secretarial initiative and Defense Board Recommendation to improve safety management across the DOE	+800
External Regulation	
■ Support transition to External Regulation with policy and guidance development for implementation of project	+400
Self-Assessment Projects	
■ Conclude Self-Assessment projects in FY 1999	-100
Chronic Beryllium Disease	
■ Beryllium transferred to the Other Defense Activities Appropriation	-800
Total Funding Change, Technical Assistance	0

National Environmental Policy Act

Mission Supporting Goals and Objectives

The National Environmental Policy Act (NEPA) program supports the implementation of the Department's proposed activities by providing the technical leadership and support needed to assure compliance with the National Environmental Policy Act and related environmental review requirements. The goal of the NEPA program is to foster sound departmental planning and decision-making and to build public trust through effective process implementation. NEPA program objectives include: (1) ensuring the timely and adequate completion of NEPA reviews through technical assistance, independent policy review, and approval recommendations for major programmatic environmental impact statements (EISs) site-wide and other EISs, and related NEPA documents; (2) ensuring the consistency and quality of NEPA documents and increasing the efficiency of NEPA personnel by determining and responding to customer needs; (3) issuing guidance on selected technical and policy topics; (4) conducting workshops for Headquarters and field NEPA personnel; and (5) participating in NEPA process improvement teams and other initiatives that foster continuing improvement of the NEPA process. Another objective is to streamline the environmental review process by issuing revised regulations and DOE Orders to reduce costs and regulatory burdens so that the process works better, costs less, and is more useful to decision makers and the public.

Significant Accomplishments

- Provide technical assistance and policy reviews and exercise quality control in the preparation of approximately 15 major environmental impact statements. (FY98: $2,000; FY99: $2,000 FY00: $2,000)
- Continue to implement NEPA streamlining efforts, including NEPA Contract Reforms, that will save more than $26 million over five years, and issue high priority guidance documents. (FY98: $1,000; FY99: $552: FY00: $500)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
NEPA	3,000	2,552	2,500	-52	-2.0%
Total, NEPA	3,000	2,552	2,500	-52	-2.0%

Detailed Program Justification

NEPA	(dollars in thousands) FY 1998	FY 1999	FY 2000
■ Provide technical assistance, policy reviews and quality control in the preparation of major programmatic environmental impact statements, site-wide and other environmental impact statements, and related documents. This activity supports the environment policy strategy: "Integrate and embed sound environment, safety and health management practices into the performance of DOE's day-to-day work," of the corporate management objective of the current Performance Agreement: "Ensure the safety and health of the DOE workforce and members of the pubic, and the protection of the environment in all Department activities." Funding levels were derived from historical information and assuming a continued level of effort for approximately 15 major environmental impact statement reviews. Performance will be measured by the number, quality and timeliness of technical assistance and policy reviews.	2,000	2,000	2,000
■ Develop guidance and policy needed to increase the efficiency of Program and Field Office NEPA personnel and continue the regulatory development process to reduce costs and regulatory burdens so that the NEPA process works better, costs less, and is more useful to decision makers and the public. This activity supports the environment policy strategy of the corporate management objective of the current Performance Agreement. Funding levels were derived based on historical information assuming a continued level of effort for the regulatory development process and for issuance of high priority guidance or policy documents. Performance will be measured by the number and quality of guidance products issued.	1,000	552	500
Total, NEPA	3,000	2,552	2,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
NEPA	
■ Streamline NEPA guidance and policy development, issue high priority guidance on policy documents	-52
Total Funding Change, NEPA	-52

Management and Administration

Mission Supporting Goals and Objectives

Management and Administration within the Office of Environment, Safety and Health (EH) consists of the following activities:

Information Management provides for the overall management of environment, safety, and health data and information for the DOE complex and other stakeholders. The office seeks to identify and facilitate access to data and information required for the successful conduct of the Department's environment, safety and health programs and activities by maintaining and integrating resources to provide for the reporting, tracking, trending, analysis, and dissemination of environment, safety, and health information and data.

EH Information Management provides life-cycle management of environment, safety, and health data and information. Through the ES&H Technical Information Services, the office provides for the reporting, analysis, tracking and dissemination of data throughout the DOE complex and to its stakeholders. Technical Information Services include the operation and maintenance of the Department's reporting systems for occurrence, radiation exposure, accident, safety performance and management, and medical and epidemiology information. Through the Worldwide Web, the Technical Information Services provides access to information in the areas of Oversight, Worker.Health and Safety, Environmental Policy and Assistance, Occupational Medicine, Medical Surveillance, Epidemiology, International Health, Lessons Learned, Integrated Safety Management, and Enforcement. Through its Technical Information Services, Information Management supports the Department's Strategic Goal of demonstrating organizational excellence in its environment, safety and health practices, in its communication and trust efforts, and its corporate management systems and approaches, as well as the Department's commitments to: (1) ensure the safety and health of the DOE workforce and the public, and the protection of the environment in all Departmental activities; (2) as a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner; and (3) use efficient and effective corporate management systems and approaches to guide decisionmaking, streamline and improve operations, align resources and reduce costs, improve the delivery of products and services, and evaluate performance. The Office also maintains an information infrastructure necessary for implementing the EH mission.

In accomplishing its mission, the Office of Information Management relies on outsourcing of information management technologies including network operations, developing applications, maintaining and supporting systems, and technology transfer. Outsourcing provides access to hard-to-find skills and new rapidly evolving technologies and helps ensure that critical skills are available for short-term projects. It provides a mechanism to ensure that budgets and schedules can be met in a highly technological environment, and that resources are applied consistent with best industry practices for level-of-effort requirements. Outsourcing also allows management to focus on its primary objectives—customer service and cost management—in an environment of declining budgets and reductions in Federal staffs. Through outsourcing, successful implementation of the Department's Strategic Alignment Initiatives, and applying the General Accounting Office's guidance for improving mission performance through strategic information management and technology, the Office has reduced

its budget by more than 55 percent since FY 1994. At the same time, the level of customer service, as measured by metrics such as customer access and services provided, has increased every year.

Based on the efficiencies and reductions achieved between FY 1994 and FY 1997, and operational experience during FY 1998, the FY 2000 Budget estimate supports the level-of-effort required to follow best practices in the operation and maintenance of quality Technical Information Services in support of the Department's environment, safety and health missions.

Management Planning efforts are focused on enhancing the Department's business systems for planning and execution of environment, safety and health activities and functions, as well as ensuring the contracts provide an effective mechanism for managing environment, safety and health activities at all Departmental sites. The focus of Management Planning directly supports the Department's goal of clearly identifying and funding environment, safety and health priorities and ensuring that resources are appropriately spent on those priorities. Specific objectives include: (1) ensure all Departmental sites conduct sufficient work-scope planning and identify and fund environment, safety and health priorities in the FY 1999 budget and annually thereafter; and (2) monitor annually and report on environment, safety and health expenditures (commitments) and improve related internal controls.

Technical Training and Professional Development provides fellowships and grants to further industrial hygiene and health physics disciplines to provide a future employment pool for all of DOE.

Significant Accomplishments

Information Management

- Manages environment, safety and health data and information by integrating information technologies to support environment, safety and health reporting, tracking, and trending systems, and operating and maintaining information management systems and infrastructure to support the Department's Occurrence Reporting and Processing System, Radiation Exposure Monitoring System, Computerized Accident/Incident Reporting System, Performance Indicator Data System, Non-Compliance Tracking System, Safety Issue Management System, the ES&H Management Plan System, and other databases required for the environment, safety and health programs throughout the complex.
  - This activity supports the Department's Strategic Goal: The Department of Energy will strive to demonstrate organizational excellence in its environment, safety and health practices, in its communication and trust efforts, and in its corporate management systems and approaches: (1) "Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities;" (2) "As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner;" (3) "Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs, improve the delivery of products and services, and evaluate performance." (FY98: $4,807; FY99: $4,757; FY00: $4,757)
- Applies Web-based technologies and communications services available through EH's Technical Information Services to make information more rapidly and reliably available to the

environment, safety and health community and other stakeholders by providing awareness of and access to information and services that support the Department's National Environmental Policy Act program, Oversight, Lessons-Learned, Fire Protection, Radiation and Chemical Safety, Worker Health and Safety, International Health, Enforcement, Voluntary Protection, Medical, Vulnerability Assessment, and Integrated Safety Management programs.

- This activity supports the Department's Strategic Goal: The Department of Energy will strive to demonstrate organizational excellence in its environment, safety and health practices, in its communication and trust efforts, and in its corporate management systems and approaches: (1) "Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities;" (2) "As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner;" (3) "Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs, improve the delivery of products and services, and evaluate performance." (FY98: $4,493; FY99: $3,843; FY00: $3,843)

Management Planning

- On an annual basis, utilizes a risk-based prioritization approach to the review of line program environment, safety and health budgets and continue to ensure that all risk-significant environment, safety and health issues are adequately addressed in the Department's budget. This is possible due to the earlier successful institutionalization and integration of environment, safety and health risk-management activities within Headquarters line program and site processes. Management Planning efforts include providing guidance to Secretarial and field offices regarding the identification and budgeting for environment, safety and health activities. In addition, as part of the Departmental corporate budget discussions, Management Planning identifies and advises the Program Secretarial Officers and the Chief Financial Officer of any major environment, safety and health vulnerabilities present in the budget request. (FY98: $1,400; FY99: $800; FY00: $800)
- Develops the Department-wide environment, safety and health planning process from planning and budgeting to program execution and tracking for improved contractor accountability and performance. All Departmental sites were required to modify their contracts by December 31, 1997, to include the new DOE Acquisition Regulation (DEAR) Clause 970.5204-2, Integration of Environment, Safety and Health into Work Planning and Execution. Information on environment, safety and health commitments for execution year and progress made in meeting them is submitted by all Departmental sites during the annual budget submission. It is anticipated that the new Conditional Payment of Fee clause, which will strengthen the ability of the Department to promote appropriate ES&H performance, will be submitted for rulemaking in late 1998. (FY98: $2,600; FY99: $700; FY00: $700)

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Technical Training and Professional Development

- Support ongoing grants, fellowships already awarded, and existing training programs at colleges and universities to ensure the education and development of the future DOE technical workforce. (FY98: $3,400; FY99: $2,503; FY00: $2,307)
- Continue to manage the planning, development, and administration of mandatory, technical, and professional development training for all EH staff. (FY98: $1,356; FY99: $400; FY00: $400)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Information Management	9,300	8,600	8,600	0	0.0%
Management Planning	4,000	1,500	1,500	0	0.0%
Technical Training & Professional Development	4,756	2,903	2,707	-196	-6.8%
Subtotal, Management and Administration	18,056	13,003	12,807	-196	-1.5%
General reduction	-782	0	0	0	0.0%
Total, Management and Administration	17,274	13,003	12,807	-196	-1.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Information Management			
■ FY 2000 performance success will be measured by increased usage of ES&H Technical Information Services through the Worldwide Web, a greater availability, scope and content of ES&H Technical Information Services, and a greater volume of ES&H data routinely reported electronically through Internet technology. ES&H community and other stakeholders have more reliable access to relevant data through Internet technology. Continue the management of environment, safety and health data and information by:			
▸ Operating and maintaining information management systems and infrastructure to support the Department's Occurrence Reporting and Processing System, Radiation Exposure Monitoring System, Computerized Accident/Incident Reporting System, Performance Indicator Data System, Non-Compliance Tracking System, Safety Issue Management System, the ES&H Management Plan System, and other databases required for the ES&H programs throughout the complex.			
▸ Integrating information technologies to support ES&H reporting, tracking, and trending systems	4,807	4,757	4,757

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue to apply Web-based technologies and communications services available through the ES&H Technical Information Services to make information more rapidly and reliably available to the ES&H community and other stakeholders. Promote awareness of, and provide access to, information and services that support the Department's National Environmental Policy Act, Oversight, Lessons-Learned, Fire, and Radiation and Chemical Safety, Worker Health & Safety, International Health Studies, Enforcement, Voluntary Protection, Medical, Vulnerability Assessment and Integrated Safety Management programs. Since the development of the overall EH technical information system, the data collection efforts are streamlined in FY 1999 and FY 2000	4,493	3,843	3,843
Total, Information Management	9,300	8,600	8,600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Management Planning			
■ Continue efforts to interface with key DOE sites in formulating sites' proposed ES&H programs and plans, conduct executive-level analysis of program cluster ES&H resource review (e.g., EM, DP, NE, ER) and program requests. The key focus is to improve the linkage between work and budget planning decisions to actual work execution, commitments and performance expectations. Specific activities that require contractor assistance include interfacing with key DOE sites (e.g., OR, RL, RF, ID) line programs efforts to ensure that proposed ES&H plans effectively address the inherent risks associated with the sites operations; assisting with the preparation of a corporate analysis of proposed line program ES&H plans and resources; and assisting in coordinating a response to external reporting requirements (e.g., Defense Nuclear Facilities Safety Board, Environmental Protection Agency) related to such Departmental issues as ES&H plans, resources, and compliance liabilities. Continue Departmental performance against its commitments under the Government Performance Results Act. Funding estimates are based on a labor hour estimate of the proposed work. This work directly supports the environment, safety and health strategy: "Ensuring DOE programs appropriately address ES&H priorities," of the corporate management objective of the current Performance Agreement. EH has collected the budget information for several years. Each year the data collection and review becomes more efficient. The sites' data is more readily accessible and useable, therefore the data collection and review expenses will decrease	1,400	800	800

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The key focus of the ES&H management plan effort is to ensure ES&H is an integral and visible element of work planning and work execution, ensure ES&H performance expectations and commitments are built into the programmatic (mission) and site-wide project milestones and priorities, and ensure commitment tracking and accountability mechanisms exist that clearly link work planning and commitments to actual work execution, performance monitoring (feedback), and financial incentives/rewards. The objective of this task is to provide corporate interface to improve the coupling between work and budget planning decisions to actual work execution commitments and performance expectations. Specific activities include working with key DOE operations offices with effective ES&H work and budget planning processes to enable the development of a mature commitment tracking system that enables line management monitoring and measuring of progress toward important ES&H commitments. Funding estimates are based on a labor hour estimate of the proposed work. This work directly supports the environment, safety and health strategy: "Ensuring DOE programs appropriately address ES&H priorities," of the corporate management objective of the current Performance Agreement	2,600	700	700
Total, Management Planning	4,000	1,500	1,500

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Technical Training and Professional Development			
■ Support ongoing grants, fellowships already awarded, and existing training programs at colleges and universities to ensure the education and availability of a future DOE technical workforce and to provide technical information which is beneficial to DOE and EH programs. FY 2000 performance will be measured by the quality and number of students that complete the Industrial Hygiene and Applied Health Physics fellowship programs.	3,400	2,503	2,307
■ Retain instructional support for the development of training activities. Conduct self assessments, as required by DOE training policy, to ensure that the EH training program is being implemented effectively and efficiently; and technical support needed for administering and upgrading the ES&H automated training management systems and databases is being maintained. Automated systems support the registration of training activities and process and store EH training data. These systems assure the accurate documentation and certification of the technical competence of the EH workforce and support grants, fellowships, and training programs at colleges and universities that enhance the recruitment of qualified graduates of critical disciplines and the development of the future DOE workforce. Also, support to Departmental training efforts is provided. The implementation of automated training systems in FY 1999 are expected to reduce support expenditures in FY 2000.	1,356	400	400
Total, Technical Training and Professional Development	4,756	2,903	2,707
Subtotal, Management and Administration	18,056	13,003	12,807
General Reduction	-782	0	0
Total, Management and Administration	17,274	13,003	12,807

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Training	
■ Training for Federal staff was transferred to Program Direction. The overall funding reduction for Technical Training & Professional Development is the result of initial downsizing of the fellowships and grants program and no new initiatives	-196
Total Funding Change, Management and Administration	-196

Environment, Safety and Health - Energy Supply

Program Direction

Mission Supporting Goals and Objectives

Program Direction in this account provides overall direction and support for Environment, Safety and Health (EH) Energy Supply programs to ensure that all operations are conducted in the most efficient and effective manner.

Program Direction in this account has been grouped into four categories:

Salaries and Benefits provide funding for a Federal staff (FY98: 175 FTE; FY99: 129 FTE; FY00: 124 FTE) who have the technical expertise to carry out the essential EH mission. The EH mission requires experts to develop overall environment, safety and health policy for DOE sites and facility operations; to provide a central and coordinated source of scarce technical expertise to all field elements; to provide a central clearing house for information, analysis and feedback regarding new efforts, present activities, and unforeseen occurrences taking place at the multitude of diverse facilities within the DOE complex; to provide the Department with independent oversight capability to perform activities relative to environment, safety and health programs across the DOE complex, and oversee the Department's health studies endeavors.

Travel includes all costs of transportation, subsistence, and incidental expenses for EH's Federal employees in accordance with Federal Travel Regulations. This also includes travel costs associated with the permanent change of duty station.

Support Services are not provided for in this decision unit, consistent with Congressional direction.

Other Related Expenses provide for the EH Working Capital Fund and training for Federal staff. The Working Capital Fund provides for non-discretionary prorated costs for items such as space utilization, computer and telephone usage, mail service, and supplies. Training includes tuition for EH Federal employees.

Significant Accomplishments

Salaries and Benefits

- Salaries and Benefits reflect the revised full-time-equivalent (FTE) split between Energy Supply and Other Defense Activities. Overall, salaries and benefits are in line with the FTEs requested and include the 4.1% Economic Assumptions provided by the Office of Management and Budget (OMB). (FY98: $16,586; FY99: $11,313; FY00: $12,910)

Travel

- Overall, EH travel requirements are consistent with the overall EH Federal staff and include the 2.1% Economic Assumptions as provided by OMB. (FY98: $1,500; FY99: $1,500; FY00: $416)

Support Services

- Given the unique nature of the Environmental Safety and Health Program, support services are not provided for in this decision unit.

Other Related Expenses

- This provides for the EH Working Capital Fund (administered by the Office of Management and Administration) which covers non-discretionary prorated costs such as space utilization, computer and telephone usage, mail service, supplies and electronic services and training for Federal Staff which includes tuition costs for EH Federal employees. 2.1% is included for the Economic Assumptions as provided by OMB. (FY98: $5,464; FY99: $5,585; FY00: $5,672)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salaries and Benefits	16,586	11,313	12,910	+1,597	+14.1%
Travel	1,500	1,500	416	-1,084	-72.3%
Other Related Expenses	5,464	5,585	5,672	+87	+1.6%
Total, Program Direction	23,550	18,398	18,998	+600	+3.3%
Full-Time-Equivalents	175	129	124	-5	-3.8%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
■ Salaries and Benefits reflect the FTE split between Energy Supply and Other Defense Activities. Overall, salaries and benefits include the Economic Assumptions provided by OMB	16,586	11,313	12,910
Travel			
■ Overall, EH travel requirements are in line with the overall EH Federal staff	1,500	1,500	416
Other Related Expenses			
■ This provides for the EH Working Capital Fund (administered by the Office of Management and Administration) which covers non-discretionary prorated costs such as space utilization, computer and telephone usage, mail service, supplies and electronic services and training for Federal staff which includes tuition costs for EH Federal employees previously budgeted in Management and Administration	5,464	5,585	5,672
Total, Program Direction	23,550	18,398	18,998

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Requirements are increased commensurate with the allocation of Federal staff between Energy Supply and Defense programs.	+1,597
Travel	
■ Requirements are decreased commensurate with the allocation of Federal staff between Energy Supply and Other Defense programs.	-1,084
Working Capital Fund	
■ Total requirement decreased commensurate with the reduction in total EH FTEs and training for Federal Staff previously budgeted in Management and Administration are included in Other Related Expenses for a net increase	+87
Total Funding Change, Program Direction	+600

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	0	0	100	+100	>999%
Working Capital Fund	1,781	1,845	1,832	-13	-0.7%
Printing and Reproduction	77	80	80	0	0.0%
Rental Space	3,259	3,300	3,300	0	0.0%
Software etc.	347	360	360	0	0.0%
Total, Other Related Expenses	5,464	5,585	5,672	+87	+1.6%

Technical Information Management

Program Mission

The mission of the Technical Information Management program (TIM) is to provide timely, accurate technical information to DOE's researchers and the public by collecting, preserving, and disseminating scientific and technical information, the principal product resulting from the multi-billion dollar Department of Energy research and development (R&D) program. The TIM program also provides worldwide energy scientific and technical information to the Department of Energy (DOE), the United States (U.S.) industry, academia, and the public through interagency and international scientific and technical information exchange agreements and coordinates technical information-related activities across DOE and its laboratories.

The Department of Energy makes a multi-billion dollar annual investment in energy- and environment-related R&D activities. The primary and immediate product of this investment is information that will lead to advances in basic science and technology; more efficient uses and conservation of our nation's energy resources; more advanced technologies for environmental protection and remediation; cleaner-burning fuels and better transportation sources.

As part of the Office of Science, the TIM program serves the U.S. research community by collecting and disseminating R&D information, increasingly in electronic, full-text form through the Internet. The program is continuing the radical transition to a new reality of reduced budget and staffing by using state-of-the-art information technology and skills. Working in partnership with other agencies, the TIM program provides the free, publicly-available Information Bridge (http://www.doe.gov/bridge) – one of the world's largest digital compilations of energy-related R&D information, containing nearly 30,000 (and growing) full-text technical reports. In addition, energy-related science journals are abstracted and indexed, resulting annually in 40,000 to 60,000 records of DOE and other domestic research being searchable with a single inquiry.

Other industrialized nations are also investing in energy R&D, and the resulting technical information is globally recognized as a valuable commodity that can be exchanged in order to save taxpayer dollars and avoid duplicative research. Representing DOE and the United States in international exchange agreements, the TIM program acquires an additional 80,000 foreign research records annually for use by the domestic science community. A large part of this foreign information acquisition comes through TIM's representation in the International Atomic Energy Agency's (IAEA) International Nuclear Information System (INIS). Under this agreement, TIM acquires foreign non-defense nuclear-related research information and fulfills the U.S. obligation to exchange its information as a member of the United Nations, to which IAEA reports.

Requirements for technical information management and dissemination are delineated in the American Technology Preeminence Act; the Paperwork Reduction Act (and implementing guidelines); Department of Energy enabling legislation; and international treaties/agreements with the International Atomic Energy Agency and the International Energy Agency.

Program Goal

To increase the payback and productivity of energy R&D by making the resulting information more easily accessible and widely available than ever before — at a lower cost per person served.

Specific GOALS include:

- Lead the Department in the collection, organization, preservation, and dissemination of scientific and technical information resulting from the Department's R&D programs; and
- Provide worldwide scientific and technical energy information to the Department, U.S. industry, academia, and the public.

Program Objectives

- Increase the number of researchers and citizens served with scientific and technical information at a lower cost per person served;
- Lead/advance the institutionalization of an electronic, decentralized technical information collection that contributes to the future development of a National Library of Energy Science and Technology;
- Negotiate and implement agreements for DOE's widespread, electronic access to U.S. science journals; and
- Provide more effective mechanisms for public access to global energy-related information.

Performance Measures

- Number of persons served with scientific and technical information and reduction in cost per person served;
- Percent of Departmental technical information exchanged electronically;
- Age and timeliness of information acquired and disseminated;
- Percent and amount of foreign energy-related information acquired to augment the U.S. collection and promote national competitiveness;
- Number of leading science journals available electronically to the DOE research community;
- Percent of DOE sites' distributed information collections linked and searchable with a single inquiry; and
- Customer satisfaction with Departmental scientific and technical information products and services.
- Continue to make available electronic journals at the desktop, and implement tools to facilitate electronic access to DOE's scientific and technical information.

Significant Accomplishments and Program Shifts

Program Support

The Technical Information Management program continues to make progress toward strategic priorities, known collectively as "Bringing Science Information to the Desktop."

- **Electronic Information Exchange and the Information Bridge**

  As technology and common standards advance, it becomes more timely and economical to exchange information in electronic media. While it will be necessary for the Department to maintain a centralized point of coordination for this electronic infrastructure (for policy, standards, archiving, etc.), Departmental elements will realize efficiencies in information technology, management, printing, and publishing as a result of Department-wide electronic exchange. EnergyFiles, a new web-based virtual library (http://www.doe.gov/EnergyFiles), puts energy science and technology information at the user's fingertips. It is a suite of Internet tools, which is now accessed over 70,000 times a month and provides one-stop access to approximately 350 different information repositories from across the DOE laboratories and other sites. The Information Bridge, which is the major component of Energy files and provides access to 30,000 full-text, electronic DOE R&D reports, will continue to enable the user to bypass expensive and time-consuming bibliographic searches and requests for paper reports. In FY 2000, the Information Bridge will be kept current with the latest in R&D results and will have at least a 50 percent increase in its user base.

- **Taking the Labor Out of Learning - Desktop Literature Searching**

  Scientific research is a cumulative and synergistic process where continued advances are dependent on previous research findings. The pace of these advances is largely dependent on researchers' and librarians' ability to locate and retrieve information pertinent to their research areas. While scientific journal articles and technical reports always cite references, locating and retrieving the full text of these references has historically been an additional, time-consuming step in the information search and possible only on the premises of major science libraries. The technology is now available to build electronic hyperlinks to the full-text referenced sources, taking a small fraction of the time of traditional searches and taking the labor out of learning. This capability, which is already being capitalized on in the life sciences at the National Library of Medicine, makes hyperlinks between electronic bibliographic systems (which are already maintained by the TIM program) and journal publishers' web sites containing full-text articles. The time is right for DOE to bring the same capability to the physical sciences research community. At the requested funding level, the requirements analysis for this capability will be completed.

- **Enhanced Access to Electronic Science Journals**

  The Technical Information Management program is aggressively pursuing agreements for the availability of electronic science journals for the Departmental research community, thereby saving the Department the cost of multiple paper-based subscriptions. Electronic journal agreements are estimated to save the Department $8,000,000 annually. In FY 2000, core science journals will be provided electronically to DOE research facilities.

- **Searching Distributed Collections**

  To complete the foundation for a future digital library for energy science and technology, technical information collections residing at DOE sites (20 plus labs and other research entities) must be linked and searchable with a single inquiry. This will be achieved through technology and standards capable of searching across multiple platforms and formats. In FY 2000, at least 5 major sites will be linked and searchable.

- **Archive of Science and Technology**

  The TIM program is the one place in the world where the Department's entire collection of scientific and technical information can be found. With the transition to the electronic information age, the repository function for the nation's energy-related science base must adapt to the new media. Interagency standards and agreements must be developed, adopted, and implemented while conserving resources and promoting information access and retrievability. The TIM program also houses a comprehensive repository of energy- and weapons-related classified and sensitive information—over 100,000 reports. Within national security requirements, the program is laying the groundwork for this collection to be protected and exchanged using new Information Age electronic technology.

- **Implementing the Transition from Paper to Electronic Information Management**

  The Department issued the Scientific and Technical Information Order, DOE O 241.1, and Implementation Guide which define the Department's new system for collecting scientific and technical information to make it searchable and retrievable. The new way of doing business described by the Order and Guide is the single most revolutionary change in the Technical Information Management program since it began in the 1940s. The Department's scientific and technical information program is being converted from a centralized paper-based one to a decentralized electronic environment. As technical information is the principal deliverable stemming from R&D, the web-based electronic TIM program is positioned to help improve the visibility of, and appreciation for, the Department's R&D. The Order and Guide were developed by a collaborative process between Laboratories, Operations Offices, and Headquarters; their development purposefully departed from command and control approaches and will ensure more timely and broadened access to results from taxpayer-supported R&D.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Technical Information Management					
Program Support	1,600	1,600	0	1,600	1,600
Program Direction	7,500	7,000	0	7,000	7,500
Subtotal, Technical Information Management	9,100	8,600	0	8,600	9,100
Construction	1,000	0	0	0	0
Subtotal, Technical Information Management	10,100	8,600	0	8,600	9,100
Use of Prior Year Balances	-68[a]	-191[a]	0	-191[a]	0
Total, Technical Information Management	10,032	8,409	0	8,409	9,100

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a]Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Operations Office					
Office of Scientific and Technical Information	10,100	8,600	9,100	+500	+5.8%
Use of Prior Year Balances	-68[a]	-191[a]	0	+191[a]	+100.0%
Total, Technical Information Management	10,032	8,409	9,100	+691	+8.2%

Site Description

The Office of Scientific and Technical Information is located on a 5 acre site in Oak Ridge, Tennessee. The mission of the TIM program is to provide timely, accurate technical information to DOE researchers and the public by collecting, preserving, and disseminating scientific and technical information. The TIM program is carried out at this one site.

[a] Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Program Support

Mission Supporting Goals and Objectives

Scientific and technical information is the principal deliverable from research and development (R&D). Department of Energy researchers, whether with laboratories, universities or contractors, document their research results in two main ways: report literature and journal literature. The TIM program plays a central role in making both types of literature searchable and retrievable.

For report literature, TIM coordinates a Department-wide program involving researchers, librarians, and program managers, which results in reports being collected, preserved, and disseminated. The Information Bridge, TIM's web product for reports, includes 2 million pages in 30,000 reports, all searchable. The Government Printing Office has found this product sufficiently valuable that it has sponsored making this web site available to the public.

For DOE-sponsored R&D that is recorded in journal literature, TIM creates bibliographic records and abstracts that allow the information to be located, searched, and retrieved. TIM makes these bibliographic systems available to the National Technical Information Service which, in turn, markets the database to vendors such as Dialog. Researchers access Dialog in order to do a literature search. Without such a bibliographic database, searches would be impossible.

All of this information is exchanged with foreign partners as part of international exchange agreements, in which the U.S. research community is given access to an additional 80,000 foreign research summaries per year, which would otherwise not be available from any other source.

Two primary laws specify and mandate DOE's technical information responsibilities: (1) Public Law 93-577, "National Energy R&D Policy Act," directs DOE to effectively manage and disseminate information resulting from R&D activities and (2) Public Law 102-245, "American Technology Preeminence Act," requires federal agencies to send technical information to the National Technical Information Service (NTIS) in the Department of Commerce. To most effectively meet these statutory responsibilities; to fulfill international information exchange obligations; and to ensure accountability for its R&D expenditures, DOE has assigned these responsibilities to the TIM program, operated by the Office of Scientific and Technical Information (OSTI) within the Office of Science. NTIS, as it has with a single entity in all federal R&D agencies, signed a Memorandum of Understanding with DOE designating OSTI as an NTIS "affiliate," whose responsibilities are to ". . . transfer to NTIS, within 15 days of the date it is first made available for public dissemination: one copy of each final scientific, technical, and engineering information product resulting from DOE's research and development activities. . ."

The TIM program receives information from over 7,000 research entities in the DOE complex; organizes the information into a searchable and retrievable collection; and, in addition to other dissemination mechanisms, submits the information to NTIS as required by the American Technology Preeminence Act. NTIS databases depend on the TIM program to collect DOE's technical information because (1) the 7,000 submitting entities (from which TIM gathers the information and maintains a coordinated collection infrastructure) would not uniformly send reports to NTIS and (2) NTIS is not equipped with the resources or capabilities to collect and organize this raw information from over 7,000

different sources. The TIM program also manages an active classified information repository of 10,000 reports, which are not exchanged with NTIS. The TIM program works with both the Government Printing Office and NTIS in disseminating the Department's R&D information to the public. These relationships are required by law. Technology is allowing for more streamlined and less redundant exchange of information.

While DOE and NTIS databases contain some of the same information, there is no redundancy between the mission of TIM and NTIS as TIM serves DOE's research community of 30,000 scientists and engineers; manages a 50-year archive of 1.1 million unclassified and 100,000 classified documents; and fulfills U.S. obligations under two international information exchange agreements, resulting in 80,000 foreign R&D summaries being available to the U.S. research community each year, a collection that would not otherwise be available from any other source. One of these exchange agreements involves the International Nuclear Information System (INIS), under the aegis of the International Atomic Energy Agency and the United Nations. Under this agreement, TIM fulfills the U.S. obligation to provide its non-defense nuclear-related R&D information and, in exchange, receives worldwide nuclear research results, which American scientists access, search, and retrieve.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Program Support	1,600	1,600	1,600	0	0.0%
Total, Program Support	1,600	1,600	1,600	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Program Support			
■ Implement "Bringing Science Information to the Desktop" initiatives, including keeping the Information Bridge current by adding 15,000-20,000 new full text technical reports; providing the DOE research community electronic access to core science journals; and establishing searchable distributed information collections and 5 major DOE research facilities. Streamline collection, management, and dissemination of DOE R&D results by continuing transition from predominately paper-based environment to electronic information exchange and locator technology. Capital equipment funding is included for computer hardware to support electronic information exchange efforts. . .	1,200	1,200	1,200
■ Enhance U.S. economic competitiveness by providing access to 80,000 foreign R&D records for domestic research and industrial communities.	200	200	200
■ Protect national security while enabling simplified electronic exchange of and access to classified technical information by beginning the digitization of 100,000 current and historic reports.	200	200	200
Total, Program Support	1,600	1,600	1,600

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Program Support	
■ There are no changes from FY 1999 to FY 2000 for Program Support.	0
Total Funding Change, Program Support	0

Program Direction

Mission Supporting Goals and Objectives

Program Direction funding provides staffing and resources to both direct and execute the Technical Information Management (TIM) mission. Federally-staffed functions include policy development and integration; U.S. and DOE representation in interagency and international information exchange agreements; and collecting, preserving, and disseminating information resulting from DOE's R&D investment. Federal employees are used when it is more economical than outsourcing or the functions are inherently governmental in nature.

Program direction is divided into the following categories:

Salaries and Benefits provides for Federal staff involved in the functions described above.

Travel provides for program-related travel to coordinate and implement partnerships within DOE and with other federal agencies to exchange electronic information and provide free access, via the Internet, to taxpayer-sponsored R&D results.

Support Services provides on-site services in such areas as mail operations, local area network support, and analysis of electronic information exchange.

Other Related Expenses represent maintenance and utilities costs for the Office of Scientific and Technical Information facility and equipment for office automation and work requirements.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge					
Salaries and Benefits	6,610	6,320	6,590	+270	+4.3%
Travel	110	90	110	+20	+22.2%
Support Services	200	100	200	+100	+100.0%
Other Related Expenses	300	200	300	+100	+50.0%
Total, Oak Ridge	7,220	6,710	7,200	+490	+7.3%
Full Time Equivalents	99	95	94	-1	-1.1%
Headquarters					
Salaries and Benefits	270	280	290	+10	+3.6%
Travel	10	10	10	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	0	0	0	0	0.0%
Total, Headquarters	280	290	300	+10	+3.4%
Full Time Equivalents	3	3	3	0	0.0%
Total Technical Information Management					
Salaries and Benefits	6,880	6,600	6,880	+280	+4.2%
Travel	120	100	120	+20	+20.0%
Support Services	200	100	200	+100	+100.0%
Other Related Expenses	300	200	300	+100	+50.0%
Total, Program Direction	7,500	7,000	7,500	+500	+7.1%
Full Time Equivalents	102	98	97	-1	-1.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
■ In the Technical Information Management (TIM) program, OSTI employees are responsible for both program direction and program execution/implementation. As such, OSTI has a percentage of its federal staff serving in an administrative or oversight capacity and the remainder serving as hands-on "implementers" of the program. Federally-staffed functions include policy development and integration; U.S. and DOE representation in interagency and international information exchange agreements; and collecting, preserving, and disseminating information resulting from DOE's R&D investment. Federal employees are used when it is more economical than outsourcing or the functions are inherently governmental in nature. In FY 2000, with 97 employees, the TIM program will continue the transition to bringing electronic science information to the desktop. The functions provided include enhancements to electronic information exchange and the DOE Information Bridge; enhanced access to electronic science journals; representing the U.S. and DOE in foreign information exchange agreements (resulting in 80,000 foreign records available to domestic researchers); electronic archiving of 50 years of DOE's legacy document collections; developing information technology applications for taking the labor out of learning and providing desktop literature searching; and searching distributed collections at DOE sites across the Complex. Achieving these functions will complete the foundation for a future digital library of energy science and technology thereby avoiding costly duplication of information collection, archiving, and dissemination by multiple DOE sites.	6,880	6,600	6,880

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Travel			
■ Travel funding is required for the partnering and coordination inherent in a nationwide, distributed research and information environment.	120	100	120
Support Services			
■ FY 2000 is at the base level of support services needed primarily for internal and external automatic data processing functions.	200	100	200
Other Related Expenses			
■ Expenses reflect facility maintenance costs, including scheduled replacement of parts, equipment, and supplies. Expenses also reflect a transition to enhanced telecommunications for handling increased information dissemination.	300	200	300
Total, Program Direction	7,500	7,000	7,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ FY 1999 salary costs reflect a lower staffing level following a major reduction in force in FY 1998. FY 2000 reflects a workforce of 1 less FTE but also includes cost of living increase of 4.2 percent, or $280,000	+280
Travel	
■ Travel increase of $20,000 is needed to coordinate with R&D sites in developing and implementing information exchange standards and priorities.	+20

	FY 2000 vs. FY 1999 ($000)
Support Services	
■ Support Services increase of $100,000 reflects a restoration of basic support to infrastructure services such as PC maintenance and training, scanning of DOE technical reports, and other information services as required of the TIM mission.	+100
Other Related Expenses	
■ Other Related Expenses increase of $100,000 includes remediation of an underground storage tank and upgrading of telecommunications capacity to manage increased volume of Internet customers.	+100
Total Funding Change, Program Direction	+500

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Test and Evaluation Studies	100	50	100	+50	+100.0%
Total, Technical Support Services	100	50	100	+50	+100.0%
Management Support Services					
ADP Support	100	50	100	+50	+100.0%
Total, Management Support Services	100	50	100	+50	+100.0%
Total, Support Services	200	100	200	+100	+100.0%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	15	0	15	+15	+100.0%
Rental Spaces/Utilities	200	150	200	+50	+33.3%
Software Procurement/Maintenance Activities/Capital Acquisitions	85	50	85	+35	+70.0%
Total, Other Related Expenses	300	200	300	+100	+50.0%

Construction

Mission Supporting Goals and Objectives

Construction funding was provided to update and renovate general purpose infrastructure in support of the TIM program.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Construction	1,000	0	0	0	0%
Total, Construction	1,000	0	0	0	0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Heating, ventilation and air condition (HVAC) Retrofits of OSTI Facility, Oak Ridge, TN (Project No. 95-A-500) was completed in FY 1998.	1,000	0	0
Total, Construction	1,000	0	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Construction	
■ There are no changes from FY 1999 to FY 2000 for Construction.	0
Total, Funding Change, Construction	0

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	0	150	200	+50	+33.3%
Total, Capital Operating Expense	0	150	200	+50	+33.3%

Construction Projects

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
95-A-500 Office of Scientific and Technical Information Heating, Ventilation, and Air Conditioning HVAC Retrofits	4,000	3,000	1,000	0	0	0
Total, Construction		3,000	1,000	0	0	0

Field Operations

Program Mission

The Field Operations account pays for the administrative staff, technical experts, and operational resources that support the direct program activities at the four multi-purpose Operations Offices - Chicago, Idaho, Oak Ridge, and Oakland, and the eighteen laboratories and facilities under their purview. Through the administration of more than 3,500 science and technology contracts and grants at universities, and other public and private entities, these resources support the Department's Strategic Plan by sustaining the managerial, business, fiduciary, contractual, and technical foundation necessary to execute the four business lines - science and technology, national security, energy research, and environmental missions.

Program Goal

Provide management and administrative services, at reduced costs through consolidation and re-engineered processes, that enable the Field to continue environmental cleanups; reduce surplus weapons' inventory, support the national laboratories and research facilities; institute environmental, safety and health initiatives; maintain communications with stakeholders; create public and private partnerships, and take advantage of reindustrialization opportunities

Program Objectives

- To maintain the field infrastructure in an environment that is safe and hazard-free.
- To streamline the procurement processes to effect a reduced award cycle time and improve contractor performance and accountability.
- To enhance information systems and technology performance and reliability
- To improve the efficiency of financial operations and effectiveness of financial reporting
- To provide the basic day-to-day operational requirements associated with a viable office environment.
- To improve communications with customers, stakeholders, and the public

Performance Measures

- Award the competitive contracts for Y-12 Plant and Oak Ridge National Laboratory
- Transfer ownership of the Water Plant to the City of Oak Ridge.
- Complete the preliminary design of the Mixed Oxide (MOX) Fuel Fabrication Facility
- Realize cost avoidance of at least 10 percent by consolidating the acquisition of information systems and network architecture.

- Automate budget transmissions between the contractor/laboratories, the Field, and Headquarters.
- Increase the percentage of commercial payments made on time to 93 or better.
- Reduce contract closeout backlogs by 10 percent.
- Certify more than 50 percent of the technical staff to handle environmental, safety and health issues.
- Reduce the Freedom of Information backlog by 10 percent.
- Increase the percentage of procurement awards made within the established lead times.

Significant Accomplishments and Program Shifts

- The Source Evaluation Board conducted the request for proposal review for the MOX Fuel Fabrication and Reactor Irradiation Services. The proposed use of MOX fuel is part of the hybrid strategy to dispose of surplus weapons-usable plutonium. This effort supports President Clinton's commitment to eliminate the accumulation of plutonium surplus.
- The solicitation for architectural and engineering services to design the PIT Disassembly and Conversion Facility was conducted. The design effort is estimated to be last approximately 30 months.
- The shipment of Spent Fuel Rods from Asia has been completed. This was a major undertaking that involved several federal agencies and four states - California, Nevada, Utah, and Idaho. To date, more than 2,000 state and local personnel have been involved.
- The contract with the University of California was renewed. The incumbent of this contract is responsible for managing three of the Department's major management and operating contractors: Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Lawrence Berkeley National Laboratory. This new performance-based contract is valued at $12.5 billion through FY 2002.
- The Brookhaven National Laboratory contract was awarded in record time, considering the complexity of the solicitation requirements.
- Through the use of a telephonic hotline, seven solicitations were issued electronically. This practice eliminated the costs for printing and mail and provided immediate access to interested parties
- Integrated Safety Management clauses are being incorporated in contractor contracts to ensure worker safety and minimize environmental releases. These metrics are periodically evaluated and modified to challenge contractor performance.
- The lease for the Human Genome Facility in Walnut Creek, California was approved. This facility will house a team of scientists from Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory that are working on the Human Genome Sequencing Project.
- Technical personnel are being certified to manage environmental, safety, and health issues. Self

assessments are being developed to help prioritize and project additional training needs

- The heating, ventilation, and air-conditioning systems were replaced to comply with air quality standards at Oak Ridge Additionally, the elevators were upgraded to minimize potential safety risks.
- A portion of Building 1916-T, located in Oak Ridge, Tennessee, was renovated in order to increase the number of occupants, leading to the relocation of approximately 110 employees from a smaller building The relocation eliminated the need for the smaller building altogether and reduces overall operating costs by approximately $500,000 per year.
- The financial systems database consolidation Phase II for all Oak Ridge Financial Service Center Clients was completed in FY 1999 making this Center of Excellence fully operational
- This account has managed a 24 percent reduction in federal staff since FY 1995, in accordance with the Department's strategic alignment initiative.

Funding Profile

(dollars in thousands)

	FY 1998 Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Field Operations	94,789	104,127	0	104,127	102,000
Use of Prior Year Balances	0	0	0	0	0
General Reduction	211 [a]	0	0	0	0
Total, Field Operations	95,000	104,127	0	104,127	102,000

Public Law Authorization

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of FY 1998 Energy and Water reduction from uncosted balances

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office	24,671	25,381	26,454	1,073 [a]	4.1%
Idaho Operations Office	17,561	19,019	19,108	89	0.5%
Oak Ridge Operations Office	32,654	37,810	34,944	-2,866 [b]	-7.6%
Oakland Operations Office	19,903	21,917	21,494	-423	-2.0%
Subtotal, Field Operations	94,789	104,127	102,000	-2,127	-2.1%
Use of prior-year balances	211	0	0	0	0.0
Total, Field Operations	95,000	104,127	102,000	-2,127	-2.1%

Site Description

Overall, these offices provide major services that support the programmatic missions of Defense Programs, Energy Efficiency and Renewable Energy, Energy Research, Environmental Management, Fossil Energy, Nuclear Energy, Nonproliferation and National Security, Uranium Enrichment, and Work for Others. The service responsibilities are indicated in "Missions Supporting Goals and Objectives." Additionally, each individual office has oversight and unique responsibilities as indicated below

Chicago Operations Office

Chicago is responsible for the integrated management of its four performance-based contractor laboratories sites -- Argonne National Laboratory, Fermi National Accelerator Laboratory, Princeton Plasma Physics Laboratory, and Ames Laboratory; and two government owned and government operated federal laboratories -- Environmental Measurements Laboratory and New Brunswick Laboratory Chicago also provides some technical support to the Brookhaven National Laboratory, another performance-based management contractor laboratory site. Chicago has cognizance of about 10,000 contractor employees located at various site offices across the nation. This responsibility includes ensuring the security and environmental safety of the taxpayer's investment -- approximately 16,000 acres of land with a physical plant worth of about $5 8 billion Chicago is often noted as a leader in both intellectual property matters and managing more than 2000 active procurement instruments Several departmental elements rely on these patent services and the expertise within this Center of Excellence for Acquisitions and Assistance

[a] Mainly due to a one percent increase in full time equivalents as authorized in the current staffing allocation.

[b] Oak Ridge received $2.9 million for modernization activities, in FY 1999 only, to net $500,000 cost avoidance annually thereafter.

Idaho Operations Office

Idaho has oversight responsibility for the Idaho National Environmental and Engineering Laboratory with its seven major operating facilities and one government owned and government operated federal laboratory, the Radiological and Environmental Science Laboratory The site covers 890 square miles (569,600 acres), includes 510 buildings entailing nearly 5 3 million square feet valued at $1.8 billion, and employees over 6,000 employees. Idaho is involved with multi-programs ranging from the DOE's Electric and Hybrid Vehicle program, Fusion Safety, Fossil Fuel activities, Advance Nuclear Test Reactor (which allows experiments under unique nuclear environments), and Environmental Restoration and Waste Management activities.

Oak Ridge Operations Office

Oak Ridge has oversight responsibility for the Oak Ridge National Laboratory (ORNL), the East Tennessee Technology Park (ETTP), Paducah Gaseous Diffusion Plant, Portsmouth Gaseous Diffusion Plant, Y-12 Plant, and the government owned and operated Oak Ridge Institute of Science and Education Laboratory (ORISE). Oak Ridge has cognizance over 15,000 contractor employees located at these sites, as well as responsibility for over 43,000 acres of land and approximately 46,000,000 square feet of facility space, valued at over $12 billion. ORNL has responsibility for the Energy Research Program's number one priority - the Spallation Neutron Source, which is scheduled to begin construction in FY 1999 The Y-12 Plant has recently resumed weapons production operations, and the ETTP is responsible for utilizing DOE assets by recycling metals, the sale of precious metals, and the disposition of uranium Other major initiatives at Oak Ridge include reducing environmental risk, reducing Y-12 weapons footprint, re-industrializing the ETTP and the Y-12 plants for commercial use; the revitalization of the scientific infrastructure; and creating public and private partnerships for regional economic development. Oak Ridge is also recognized as one of the Department's three Financial Centers of Excellence

Oakland Operations Office

Oakland is responsible for supporting the national securities and science, physics and biomedical research, and high energy physics activities which contribute to the California economy. These activities are conducted mostly at the following major laboratories of which Oakland has oversight responsibility: Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, and Stanford Linear Accelerator Center Oakland administers more than 1,600 contracts, grants and assistance awards valued at about $28 billion. OAK manages $1.2 billion in major industrial contracts with Westinghouse, General Electric, General Atomics and Combustion Engineering. As such, Oakland administers all grants west of the Mississippi and consequently, operates a Grants Center of Excellence.

Field Operations

Mission Supporting Goals and Objectives

Seventy percent of this program direction account pays salary and benefits of roughly fifty percent of the federal personnel located at each operations office. The staffing levels are consistent with the most current strategic alignment allocation for FY 2000. This level represents a 24 percent staffing decline from the FY 1995 baseline. The staffing supports the administrative and technical personnel that are responsible for managing the office, financial stewardship, personnel management, contract and procurement execution, human resources, labor relations, legal counsel, public and congressional liaison, patent and legal services, environmental compliance, safety and health management, infrastructure operations maintenance, information systems development and support, and reindustrialization.

The remaining thirty percent pays for a broad mix of costs that the operations offices' encounter during the execution of a fiscal year. The major costs are the fixed costs associated with rent, utilities, and telecommunications Other requirements such as information systems support, administrative support, mail services, printing and reproduction, travel, certification training, vehicle acquisition and maintenance, equipment, classified/unclassified data handling, records management, health care services, guard services, and facility and ground maintenance are also included. These costs are relatively fixed in that the level of effort may be reduced but not to the extent that the total cost can be eliminated without crippling office performance and productivity. The offices are also responsible for suppling office space and work material for the Office of Inspector General located at each site. With the budget reductions over the immediate past years, these areas are already funded at the minimum level necessary to support the Department's critical missions in the Field.

Other operational requirements funded include occasional contractor support to perform ecological surveys, costs validations, and environmental assessments, ensure compliance with Defense Nuclear Safety Board safety initiatives, abide by site preservation laws and regulations, and perform procurement contract closeouts activities. These costs requirements, influenced by Departmental and programmatic initiatives as well as regional and congressional constituents, are very unpredictable, so much so that, major refurbishment and desperately needed investments in office automation and computing upgrades were sacrificed to balance the increases in past years.

Beginning with the FY 1999 budget cycle, the Department initiated a specific plan for funding major refurbishment, projected to net annual savings, and modernization investments needed to enhance efficiency in the downsizing environment, sustain consolidated service centers, minimize safety hazards, update systems technology infrastructure, and support community outreach initiatives. To this avail, annual requirements of $5 million was supported by the Department beginning in FY 1999, to continue through FY 2004 In FY 1999, office space is being refurbished to increase occupancy and eliminate a smaller building at Oak Ridge -- all to net a $500,000 cost avoidance annually. Computer servers will be acquired to support corporate architecture at both Oak Ridge and Oakland. And lastly, obsolete computer desktop hardware has been replaced with 94 enhanced desktop workstations at Chicago. The initiatives included in the plan for FY 2000 have been terminated.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago					
Salary and Benefits	18,628	18,958	20,036	1,078	5 7%
Travel	500	460	480	20	4.2%
Support Services	1,945	2,021	2,063	42	2.0%
Other Related Expenses	3,598	3,942	3,875	-67	-1.7%
Total, Chicago	24,671	25,381	26,454	1,073	4.1%
Full Time Equivalents	246	250	253	3	1.2%
Idaho					
Salary and Benefits	9,396	9,754	10,003	249	2 5%
Travel	400	390	404	14	3.5%
Support Services	4,190	4,560	4,670	110	2.4%
Other Related Expenses	3,575	4,315	4,031	-284	-6 6%
Total, Idaho	17,561	19,019	19,108	89	0 5%
Full-Time Equivalents	126	130	125	-5	-3.8%
Oak Ridge					
Salary and Benefits	24,946	25,800	26,636	836	3.1%
Travel	345	345	345	0	0.0%
Support Services	2,151	2,540	2,616	76	2.9%
Other Related Expenses	5,212	9,125	5,347	-3,778	-41.4%
Total, Oak Ridge	32,654	37,810	34,944	-2,866	-7.6%
Full-Time Equivalents	346	361	336	-25	-6.9%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oakland					
Salary and Benefits	13,880	15,207	13,743	-1,464	-9.6%
Travel	200	200	214	14	7.0%
Support Services	2,369	3,131	3,497	366	11.7%
Other Related Expenses	3,454	3,379	4,040	661	19.6%
Total, Oakland	19,903	21,917	21,494	-423	-1.9%
Full-Time Equivalents	183	197	165	-32	-16.2%
Total Field Operations					
Salary and Benefits	66,850	69,719	70,418	699	1.7%
Travel	1,445	1,395	1,443	48	3.4%
Support Services	10,655	12,252	12,846	594	4.8%
Other Related Expenses	15,839	20,761	17,293	-3,468	-16.7%
Subtotal, Program Direction	94,789	104,127	102,000	-2,127	-2.0%
Use of Prior-Year Balances	211	0	0	0	0.0%
Total, Program Direction	95,000	104,127	102,000	-2,127	-2.0%
Full-Time Equivalents	901	938	879	-59	-6.3%

Detail Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
This account pays for the institutional management and matrix support federal staff at the operations offices This funding level will support 879 full time equivalents and the 868 positions authorized by the end of FY 2000 This is a 6 percent reduction in full time equivalents from FY 1999 which equates to a $3 9 million cost avoidance The losses in full time equivalents occurred within lower graded administrative and staff positions yielding protection for maintaining critical expertise and skill mix in other areas The number of remaining positions is 58 less than originally authorized for FY 2000	66,850	69,719	70,418
Travel			
These funds provide the field offices the opportunity to participate on task teams, work various issues, facilitate policy formulation at headquarters, conduct compliance reviews, and perform contractor oversight to ensure implementation of DOE orders and regulatory requirements at the facilities under their purview It also provides for attendance at conferences and training classes, and permanent change of station relocation, etc	1,445	1,395	1,443
Support Services			
These funds provide information management systems and administrative support necessary to supplement the fundamental requirements at each office Seventy-one percent of this support services request is dedicated to ensuring that the information systems are maintained by technical experts Such services include, computer programming, local area network connectivity and backup, computer desktop maintenance, staffed communications centers, and audio/TeleVideo operations The remainder covers a smorgasbord of services including mail distribution, contract closeout assistance, remote site office assistance, staffed copy and distribution centers, staffed supply stores, trash removal, logistics services, facility and grounds maintenance, and janitorial services, etc	10,655	12,252	12,846

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Other expenses provide for the essential day-to-day requirements associated with operating a viable office Seventy percent of the request pays for the rent, utilities, and telecommunication at each office This account has been able to reduce some rental costs by eliminating the amount of space occupied. However, the rental cost for Oakland alone is almost $3 million as a result of an increase imposed by General Services Administration for FY 2000 The remaining thirty percent enables the offices to pay for postage, printing and reproduction, computer hardware and software acquisitions, copier leases, and in most cases the site-wide health care service and vehicle fleet maintenance Employee training and development and the supplies and furnishings used by the federal staff are also included, etc	16,050	20,761	17,293
Total, Program Direction	95,000	104,127	102,000

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ Salaries and Benefits increases due to the general pay and locality raises, promotions, and within grades This increase is the net effect of the following authorized adjustments in full time equivalents, totaling 59 less than FY 1999. Chicago up by 3, Idaho down by 5, Oak Ridge down by 25, and Oakland down by 32	+699
Travel	
■ Travel increases to support the staffing and transportation requirements for each office The cost range for air transportation is varied depending on the points of origin and destination Hence the travel allocations are based on historical activities and the increased costs for air fare and transportation	+48
Support Services	
■ Support Services increases with the fixed inflationary rate changes as established within existing contractual terms	+594
Other Related Expenses	
■ Other Related Expenses decreased overall This is the result of a $600,000 adjustment in Oakland's rent imposed by General Services Administration and $449,000 associated with utilities and telecommunications services in general for the remaining offices Furthermore, modernization initiatives planned for FY 2000 have been terminated (-$4,517,000)	-3,468
Total Funding Change, Program Direction	-2,127

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	%Change
Technical Support Services					
Feasibility of Design Consideration	0	0	0	0	0.0%
Test and Evaluation Studies	590	0	0	0	0.0%
Economic and Environmental Analysis	10	385	396	11	2.9%
Total, Technical Support Services	600	385	396	11	2.9%
Management Support Services					
Administrative	2,760	3,201	3,332	131	4.1%
ADP Support	7,295	8,666	9,118	452	5.2%
Total Management Support Services	10,055	11,867	12,450	583	4.9%
Subtotal, Support Services	10,655	12,252	12,846	594	4.8%
Use of Prior Year Balances	0	0	0	0	0.0%
Total, Support Services	10,655	12,252	12,846	594	4.8%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	946	1,031	1,031	0	0.0%
Printing and Reproduction	596	590	586	-4	-0.7%
Rent & Utilities & Telecommunication	9,826	11,190	12,239	1,049	9.4%
Information Technology	566	1,695	600	-1,095	-64.6%
Other	3,905	6,255	2,837	-3,418	-54.6%
Subtotal, Other Related Expenses	15,839	20,761	17,293	-3,468	-16.7%
Use of Prior Year Balances	211	0	0	0	0
Total, Other Related Expenses	16,050	20,761	17,293	-3,468	-16.7%

Oak Ridge Landlord

Mission Supporting Goals and Objectives

Provide general infrastructure support for Oak Ridge Operations site and general operating costs for other activities adjacent to the Oak Ridge National Laboratory, the Y-12 Plant and the East Tennessee Technology Park.

Program Goals

Maintain the infrastructure of the Oak Ridge facilities in order to serve all users, including Energy Research, Defense Programs, Environmental Management and Nuclear Energy. The program provides physical security, emergency management, roads and grounds, and activities associated with the Oak Ridge Financial Service Center (ORFSC).

- *To continue to support physical security* - Provide 3-shift, 24 hour protective service for the four customers located at the site.
- *To continue to provide world class Financial Services Center* - The ORFSC will be focusing on implementation of Department-wide initiatives such as EC-web, consolidation of Travel Manager databases and other Departmental Integrated Standardized Core Accounting System (DISCAS) enhancements to improve efficiencies.
- *To continue to provide roads and grounds Maintenance* - Supports repairs of roads or portions of roads outside fenced areas of the Oak Ridge Reservation especially the Bethel Valley Road to the best of the programs ability.
- *To continue to solicit support from the broad community which uses the American Museum of Science and Energy* - Continue to serve as a public affairs and communications tool for transferring information to a broad community of users, thus supporting the DOE public information program by disseminating information regarding energy technologies and the policies and programs that affect them.
- *To upgrade water plant system with backflow preventer and booster pump* - Supports transfer of ownership of the Water Plant to the City of Oak Ridge as soon as possible.

Performance Measures

Performance measures related to productivity savings by improving the day to day landlord operations.

- Reduce use of overtime by the physical security personnel by 10% in FY 2000, through better resource planning, without compromising physical security.
- Ensure that personnel continue to maintain core competency in their ES&H and security roles through review and evaluation of training records and certifications.
- ORFSC will achieve timely payments of 96% of commercial subject to the Prompt Payment Act.

Modernize and consolidate facilities for efficient operations. Success will be measured in FY 2000 by:

- Completing the transition activities at the Water Plant by title and functions to the City of Oak Ridge.

Funding Detail

(dollars in thousands)

	FY 1998 Comparable Appropriation	FY 1999 Budget Request	FY 2000 Request
Operating Expense			
Museum	1,400	1,100	1,100
Physical Security	1,700	1,900	2,184
Emergency Operations Center	1,152	1,500	1,500
Water Plant Transition Activities	0	0	300
ES&H Activities - Compliance	550	800	800
ES&H Activities - Slope Project	1,500	0	0
Financial Services Center (Automation)	1,637	1,350	1,480
Litigation	0	0	0
Roads and Grounds	830	1,100	1,628
Directives/Orders	145	400	400
Training/Development	240	400	400
Federal Building Infrastructure	0	580	150
Payment in Lieu of Taxes	1,700	1,700	1,700
Miscellaneous/Other Expenses	146	170	170
Total, Oak Ridge Landlord	11,000	11,000	11,812

Significant Accomplishments and Program Shifts

- The Water Plant Modernization Project will be replaced by other transition activities related to the transfer of the Water Plant to the City of Oak Ridge.
- The ORFSC continues to support its satellite offices' financial operations. Offices served are Richland Operations Office, Rocky Flats Field Office, Savannah River Operations Office, Strategic Petroleum Reserve Office, Office of Scientific and Technical Information, Federal Energy Techynology Center (Morgantown and Pittsburgh sites), and Oak Ridge Operations Office. ORFSC performs the payment function for all of these satellite offices in accordance with established Memorandum of Understanding. DISCAS will be operated in one consoldidated data base with overall systems support being provided by ORFSC. Work processes will continue to be monitored and needed enhancements incorporated.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Landlord	11,000	11,000	11,812	812	+7.4%
Total, Oak Ridge Landlord	11,000 [a]	11,000	11,812	812	+7.4%

[a]Includes $1,5000,000 reprogramming within the Energy Supply, Research and Development appropriations account

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Federal Building Infrastructure	0	580	150
■ Continuation of ongoing activities associated with the Emergency Management Program Office, roads and grounds and physical security	3,682	4,500	5,312
■ Continuation of the American Museum of Science and Energy. While urging funding by private or industrial partners, and an admissions fee for adults	1,400	1,100	1,100
■ Payment in lieu of taxes to the City of Oak Ridge, and Anderson and Roane Counties	1,700	1,700	1,700
■ ES&H compliance activities at Water Plant and other DOE-owned facilities	370	800	800
■ Water Plant transition activities	0	0	300
■ Identification, packaging, and shipment of documents relating to Human Radiation Experimentation (HRE) to the National Archives for permanent storage. Mapping activities and support for small businesses.	146	170	170
■ Respond to Defense Nuclear Facility Safety Board (DNFSB)recommendations involving directives management, training and development, emergency management, and ES&H.	565	800	800
■ Activities associated with the Oak Ridge Financial Service Center implementation of other department-wide initiatives.	1,637	1,350	1,480
■ ES&H activities associated with correcting the instability of a steep slope supporting the water reservoir	1,500	0	0
Total, Oak Ridge Landlord	11,000	11,000	11,812

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ Increase in physical security	+284
■ Increase in Roads and Grounds	+528
■ Increase in Oak Ridge Financial Services Center for Hardware & PC Upgrades	+130
■ Decrease in Federal Building Infrastructure	-430
■ Increase in Water Plant activities	+300
Total Funding, Oak Ridge Landlord	+812

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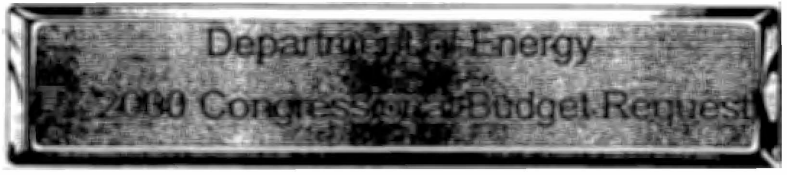

Science
Nuclear Waste Disposal
Defense Nuclear Waste Disposal
Departmental Administration
Inspector General
Working Capital Fund

February 1999

Office of the Chief Financial Officer

Volume 3

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The Department of Energy's FY 2000 Congressional budget justification will be available on the CFO homepage at http://www.cfo.doe.gov/budget/00budget/index.htm

Appropriation Summary

	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy and Water Development Appropriations					
Energy supply	950,417	787,091	841,888	54,797	7 0%
Uranium supply & enrichment activities	-3,535	—	—	—	—
Non-defense environmental management	505,181	431,200	330,934	-100,266	-23 3%
Uranium enrichment D&D fund	230,200	220,200	240,198	19,998	9 1%
Science	2,260,174	2,697,860	2,835,393	137,533	5 1%
Departmental administration	133,280	73,945	123,490	49,545	67 0%
Office of the inspector general	27,500	29,000	30,000	1,000	3 4%
Atomic energy defense activities.					
Weapons activities	4,146,692	4,400,000	4,531,000	131,000	3 0%
Defense environmental restoration & waste management	4,424,660	4,320,567	4,505,676	185,109	4 3%
Defense facilities closure projects	890,800	1,041,740	1,054,492	12,752	1 2%
Environmental management privatization	200,000	228,357	228,000	-357	-0 2%
Other defense activities	1,695,867	2,221,676	1,792,000	-429,676	-19 3%
Defense nuclear waste disposal	190,000	189,000	73,000	-116,000	-61 4%
Total, Atomic energy defense activities	11,548,019	12,401,340	12,184,168	-217,172	-1 8%
Power marketing administrations	243,619	237,510	199,947	-37,563	-15 8%
Federal energy regulatory commission	—	—	—	—	—
Nuclear waste disposal	156,000	169,000	297,000	128,000	75 7%
Geothermal resources development fund	—	—	-821	-821	—
Total, Energy and Water Development Appropriations	16,050,855	17,047,146	17,082,197	35,051	0 2%

Appropriation Summary

	FY 1998 Current Approp.	FY 1999 Current Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Interior and Related Agencies Appropriations					
Fossil energy research and development	356,517	384,056	364,000	-20,056	-5.2%
Alternative fuels production	-1,500	-1,300	-1,000	300	23.1%
Naval petroleum and oil shale reserves	107,000	14,000	—	-14,000	-100.0%
Elk Hills school lands fund	—	36,000	36,000	—	—
Energy conservation	584,354	627,701	837,515	209,814	33.4%
Economic regulation	2,725	1,801	2,000	199	11.0%
Strategic petroleum reserve	207,500	160,120	164,000	3,880	2.4%
Energy information administration	66,800	70,500	72,644	2,144	3.0%
Clean coal technology	-101,000	-40,000	-246,000	-206,000	-515.0%
Total, Interior and Related Agencies Appropriations	1,222,396	1,252,878	1,229,159	-23,719	-1.9%
Uranium enrichment D&D fund discretionary payments	-388,000	-398,088	-420,000	-21,912	-5.5%
Excess fees and recoveries, FERC	-10,159	-29,446	-28,342	1,104	3.7%
Colorado river basin	-16,098	-16,098	-21,000	-4,902	-30.5%
Total, Department of Energy	16,858,994	17,856,392	17,842,014	-14,378	-0.1%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Energy and Water Development Activities				
Energy Supply	1,536	1,629	1,331	-18.3%
Science	263	318	325	2.2%
Atomic Energy Defense Activities				
Weapons Activities	1,837	1,876	1,799	-4.1%
Environmental Restoration & Waste Mgmt	2,782	2,764	2,697	-2.4%
Other Defense Activities	846	736	964	31.0%
Total Atomic Energy Defense Activities	5,465	5,376	5,460	1.6%
Departmental Administration	1,258	1,302	1,303	0.1%
Inspector General	245	266	257	-3.4%
Power Marketing Administration	4,253	4,347	4,309	-0.9%
Federal Energy Regulatory Commission	1,318	1,320	1,320	-0.0%
Nuclear Waste Fund	202	197	196	-0.5%
Total, Energy & Water Development Activities	14,540	14,755	14,501	-1.7%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Interior and Related Agencies				
Clean Coal Technology	61	67	60	-10.4%
Fossil Energy Research & Development	660	679	681	0.3%
Naval Petroleum & Oil Shale Reserves	59	54	39	-27.8%
Energy Conservation	419	441	426	-3.4%
Economic Regulation	22	17	16	-5.9%
Strategic Petroleum Reserve	132	135	125	-7.4%
Energy Information Administration	382	378	371	-1.9%
Total, Interior & Related Agencies Activities	1,735	1,771	1,718	-3.0%
Total, Department of Energy	16,275	16,526	16,219	-1.9%

Science

Proposed Appropriation Language

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses necessary for science activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion, and purchase of not to exceed [5] *6* passenger motor vehicles for replacement only, [$2,682,860,000] *$2,835,393,000,* to remain available until expended[: *Provided,* That $7,600,000 of the unobligated balances originally available for Superconducting Super Collider termination activities shall be made available for other activities under this heading]. *(Energy and Water Development Appropriations Act, 1999.)*

[An additional amount of $15,000,000, to remain available until expended, for Department of Energy—Energy Programs, "Science", is hereby appropriated.] *(Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, Public Law 105-277, Division A, Section 109.)*

Office of Science

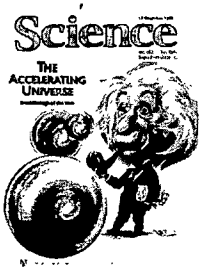
Executive Budget Summary

The Office of Science (SC) requests $2,844 Million for Fiscal Year 2000, an increase of $138M over FY 1999, to invest in thousands of individual research projects at hundreds of research facilities across the U.S., primarily in our national laboratories and research universities. The FY 2000 request will allow for continued construction of the Spallation Neutron Source, the first world class neutron source built by the U.S. in over 30 years; a new Scientific Simulation Initiative that will revolutionize our ability to solve scientific problems of extraordinary complexity and enable us to apply these new resources toward advancing DOE missions; participation in the Next Generation Internet effort with a focus on R&D and implementation of the technologies and tools that help meet mission requirements and contribute to the Scientific Simulation Initiative.

A History of Success:

Past successes from the SC research program and scientific user facilities have produced a rich history of contributions to science and society.

- Supported the work of 66 Nobel Laureates, from Enrico Fermi and E.O. Lawrence to Richard Smalley and Paul Boyer.
- SC's High Energy Physics program Supported *Science Magazine's* "1998 Breakthrough of the Year - *The Accelerating Universe*"



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- Developed the original prototype for positron emission tomography (PET) and the most widely used radio-pharmaceuticals used in nuclear medicine, provided the knowledge base for the nation's, and world's, radiation exposure standards, established the first Human Genome Program and the first global climate change research program.
- Advanced our understanding of the subatomic world and the fundamental forces and particles of nature through forefront research and research facilities, including the world's first super-conducting accelerator. These facilities offer a window into the most elusive particles and interactions at the very heart of matter illuminating the origin of the universe.
- Building on the advances of accelerator physics, synchrotron light sources were first conceived, constructed and utilized by SC scientists for research that enabled the discovery of new materials, advanced chip technologies, and breakthroughs in structural biology.
- Provided the first scientific investigation of multi-megawatts of fusion power produced in laboratory plasmas.

A Notable Change:

During FY 1999 budget deliberations, in recognition of more than 50 years of contributions to science and basic research, Congress changed the name of the Office of Energy Research to the Office of Science. With the FY 2000 budget request, we begin a new era as the Office of Science and, looking ahead to the challenges and opportunities of the twenty-first

century, we are building a new SC strategic plan for the future research needs of the Department.

Our Mission Hasn't Changed:

Our mission remains to: produce the scientific and technical knowledge needed to develop energy technology options; understand the health and environmental implications of energy production and use; maintain U.S. leadership in understanding the fundamental nature of energy and matter; provide and operate the large-scale facilities required in the natural sciences; ensure U.S. leadership in the search for scientific knowledge; and support the availability of scientific talent for the next generation.

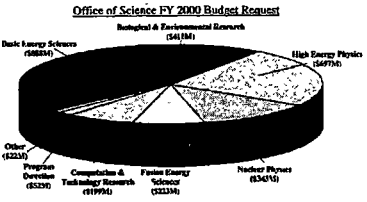

Figure 1

The FY 2000 budget request, depicted in Figure 1 and Table 1, has a program structure, that meets our mission consistent with Department goals and strategies. The major programs of the Office of Science are: High Energy and Nuclear Physics, Basic Energy Sciences, Biological and Environmental Research, Computational and Technology Research, and Fusion Energy Sciences.

The Department of Energy is a science agency because its mission and goals require technologies and scientific knowledge far beyond that which is currently available. From safeguarding the nuclear stockpile to ensuring our nation's energy supply for the next century, DOE continues to challenge the frontiers of science and technology.

The DOE Strategic Plan outlines the vision, goals and strategic objectives that will, through leadership in science and technology, help the DOE to meet those challenges. In keeping with the Government Performance and Results Act (GPRA), the Office of Science FY 2000 budget request includes program specific goals, strategies, and measures that focus our research activities and ensure continuity with Departmental plans and national goals.

Rethinking Our Goals and Strategies:

In the past year, the Department has begun to characterize the whole of our R&D efforts across business lines. The purpose and scope of this effort are to extend the work of the new SC strategic plan in terms of the R&D investments that enable us to meet our objectives and goals, and to assemble key information for improving our analysis and management of these investments.

The Office of Science's basic research supports and enables the R&D of the other business lines. A Science Portfolio has been developed with this fact in mind so as to clarify and improve integration of our program results throughout the Department. This Portfolio accompanies the release of the FY 2000 budget request.

As the Department builds R&D portfolios for its other business lines, the Office of Science will continue to integrate basic research with the applied R&D in the other business lines' portfolios so that there are strong linkages between technology needs and science.

The revised Strategic Plan of the Office of Science, to be published in Spring 1999, will articulate the long-range vision, goals, strategies, and objectives for our programs. The Science Portfolio complements and supports the strategic plan by providing a near-term "snapshot" of our investments against the new strategic framework.

The motivations behind this planning effort are to develop a shared long-term focus for SC programs, their scientific communities and performers; to position our future scientific program content to better serve the other DOE business lines and provide a framework for cooperation and risk taking; to project future possibilities and directions for our programs based on the latest technologies and scientific advances; to better illustrate the unique and coordinated role of SC programs within the DOE mission and the federal science investment; to inspire our researchers and to better communicate our program content and successes to our sponsors and the general public.

The new SC strategic plan, and supporting Science Portfolio, is structured around five high-level goals with twelve strategic objectives, listed in Figure 2. These goals were developed through a series of planning activities and workshops that drew on the experience and knowledge of our research scientists and stakeholders to capture both what is necessary and what is possible for our science as we look to the next century.

The first goal, **Fueling the Future**, is centered on science for affordable and clean energy options for the future. Some of the questions that motivate this goal are: *How can we tap and harness affordable, clean fuels? What clean new electric power systems will fuel the future?* and *How can energy systems be made more efficient and environmentally sound?* Development of this goal has been closely connected with the development of the Energy R&D portfolio and the objectives directly map onto the energy portfolio.

The second goal, **Protecting our Living Planet**, is centered on understanding energy impacts on people and the biosphere. Some of the questions that motivate this theme are: *What are the sources and fate of energy-related by-products? What factors affect global climate and how can they be controlled?* and *How do complex biological and environmental systems respond to our energy use?* This goal also contributes to both the Energy R&D portfolio and the Environmental R&D portfolio.

- **Fueling the Future**
  - New Fuels
  - Clean and Affordable Power
  - Efficient Energy Use
- **Protecting Our Living Planet**
  - Sources and Fate of Energy By-Products
  - Impacts on People and the Environment
  - Prevention and Protection
- **Exploring Energy and Matter**
  - Components of Matter
  - Origin and Fate of the Universe
  - Complex Systems
- **Extraordinary Tools for Extraordinary Science**
  - Instrumentation for the Frontiers of Science
  - Scientific Simulation
  - Institutional Capacity
- **Enabling World Class Science**

Figure 2

The third goal, **Exploring Energy and Matter**, is centered on discovering the building blocks of atoms and life. Some of the questions that motivate this theme are: *What are the fundamental components of matter? How can the origin and fate of the Universe reveal the secrets of energy, matter and life?* and *How do atoms and molecules combine to form complex dynamic systems?* This goal captures the most fundamental research in the Office of Science. The complex systems question links to R&D efforts in all of the DOE business lines.

The fourth goal, **Extraordinary Tools for Extraordinary Science**, is centered on the national assets that DOE provides for forefront, multidisciplinary research. This goal builds on the unique role of the Office of Science in providing the nation with forefront research facilities such as the National Laboratories, and an array of research accelerators, reactors and other unique facilities. The Office of Science will continue to ensure that these critical research

tools remain accessible to peer reviewed researchers from all across the nation and meet the technical challenges of forefront scientific investigation. This goal looks to the future and to training and educating the next generation of scientists and engineers.

Some of the questions that motivate this goal are: *How can we explore the frontiers of the natural sciences? How can we predict the behavior of complex systems?* and *How can we strengthen the nation's capacity for multidisciplinary science?* This goal enables research in all of the DOE business lines. By organizing future facilities needs, as identified by the scientific community, this theme ensures that America's research capability will remain both accessible and state of the art.

The fifth goal, **Enabling World Class Science**, conveys the commitment of DOE and National Laboratory staff to continuously improve their operational processes. Of paramount importance is the selection and conduct of excellent, productive science that is carried out safely and with care for the environment and involvement of local communities.

Implementing the New Strategies - Initiatives for FY 2000:

These five goals provide a framework for current programs and a platform for future efforts. FY 2000 initiatives and priorities are detailed below. Figure 3 lists these initiatives and identifies linkages to the SC goals.

Scientific Simulation Initiative - It is now possible to obtain computational capabilities 100 times faster than currently in common use through the application of technologies developed for the Accelerated Strategic Computing Initiative (ASCI). Therefore the Department of Energy, in coordination with the National Science Foundation and other federal science programs, has developed a Scientific

	Feel the Future	Protect Our Living Planet	Explore Energy & Matter	Extraordinary Tools for Extraordinary Science
Scientific Simulation Initiative	✓	✓	✓	✓
Spallation Neutron Source	✓			✓
Large Hadron Collider			✓	✓
Scientific User Facilities	✓	✓	✓	✓
Next Generation Internet				✓
Climate Change Technology Initiative	✓	✓		
Genome	✓	✓	✓	✓

Figure 3

Simulation Initiative (SSI) in support of the President's Information Technology Initiative. The mission of the SSI is to further develop and employ the emerging generation of very high performance computers as major tools for scientific inquiry. These resources will revolutionize our approach to solving complex problems in *energy, environment, and fundamental research* and will stimulate our national system of innovation.

Portions of the program will be directed by a joint SC/Defense Programs ASCI research management committee. Within the Office of Science, the SSI will be an integrated effort with the Computational and Technology Research (CTR) program coordinating and overseeing competitive, peer reviewed selections of sites and applications. CTR, with Basic Energy Sciences (BES) and Biological and Environmental Research (BER), will manage the basic research applications.

Combustion - Currently, eighty-five percent of U.S. energy use is derived from the combustion of fossil fuels and this dependence on combustion is not likely to change in the coming decades. Combustion remains one of the primary causes of lowered air quality in urban environments. At present, engineers have neither sufficient knowledge nor the computational tools to understand and predict the chemical outcome of combustion processes with any degree of

practical reliability. Existing models that guide the design process are of very limited usefulness because of the extraordinary complexity of the combustion process. With very high end computing resources and a concerted research program in combustion modeling, we can develop the next generation of combustion modeling tools for accelerated design of combustion devices meeting national goals of emission reduction and energy conservation.

Global Systems -Unlike many disciplinary areas of research, the complex workings of the global environmental system cannot be studied in a laboratory setting. The integration of knowledge from the many disciplines that together describe the global system can only be performed in computer simulation models. It is only through such general circulation models that it is possible to understand current climate and climate variability and to predict future climate and climate variability, including prediction of the possible effects of human activities on the global system. Advances in scientific understanding are therefore predicated upon the successful development of modeling tools to keep pace with the rapid advances in the quality and quantity of data available. These tools will lead to the development of detailed fully coupled global system models that accurately reproduce, and ultimately predict, the behavior of the interacting components of the system, i.e. the global atmosphere, the world ocean, the terrestrial land surface and both glacial and sea ice.

Fundamental Research - Whereas the scientific accomplishments of this century have resulted in seeking and understanding the fundamental laws that govern our physical universe, the science of the coming century will be characterized by synthesis of this knowledge into predictive capabilities for understanding and solving a wide range of scientific problems, many with practical consequences. In this endeavor, the computer will be a primary instrument of scientific discovery. Many areas of scientific inquiry, critical to the department's mission, will be advanced dramatically with access to high-end computation - including, but not limited to, materials sciences, structural genomics, high energy and nuclear physics, subsurface flow, and fusion energy research.

The **Spallation Neutron Source** (SNS) - The importance of neutron science for fundamental discoveries and technological development has been enumerated in all of the major materials science studies over the past two decades, including a major study by the National Research Council entitled "Major Facilities for Materials Research and Related Disciplines" (Seitz-Eastman Report)

As the needs of our high-technology society have changed, so has the way in which we conduct the R&D that helps us to meet those needs. It has become increasingly important to develop new materials that perform under severe conditions and yet are stronger, lighter, and cheaper. Major research facilities are used to understand and "engineer" materials at the atomic level so that they have improved macroscopic properties and perform better in new, demanding applications.

The SNS is a next-generation facility for these types of applications. Neutron scattering will play a major role in all forms of materials design and understanding. This research will lead to the development of advances such as: smaller and faster electronic devices; lightweight alloys, plastics and polymers for transportation and other applications; magnetic materials for more efficient motors and for improved magnetic storage capacity; improved understanding of form and function in biological structures and the development of new drugs for medical care.

Upon completion, the SNS will be the world's most powerful neutron source, accommodating more than 1,000 researchers and 30 to 40 special purpose instruments.

The SNS Total Project Cost (TPC) is estimated to be $1,360 million over a 7.25-year schedule. The

original TPC of $1,333 million (7-year schedule) was independently validated to within 1%. Throughout the life of the project, semi-annual reviews will track cost and management. FY 1999 funding provided for the start of Title I design activities, initiation of subcontracts and long-lead procurement, and continued R&D to reduce technical and schedule risks. FY 2000 funding of $214M will support Title II (detailed) design for the technical components and control systems. Construction will begin in FY 2000 on some of the conventional facilities as will the procurement of key technical equipment.

The SNS project is an example of DOE's commitment to use the DOE laboratories as a system. Under DOE leadership, Oak Ridge National Laboratory is responsible for the project with participation from Lawrence Berkeley National Laboratory, Los Alamos National Laboratory, Brookhaven National Laboratory, and Argonne National Laboratory. The laboratories have been working together most effectively and R&D is proceeding smoothly.

Scientific Facilities Utilization - This FY 2000 budget request continues to strongly support Scientific Facilities Utilization in the following programs: Basic Energy Sciences, High Energy Physics, Nuclear Physics, Fusion Energy Sciences, Biological and Environmental Research, and Computational and Technology Research. Each year, over 15,000 university, industry, and government sponsored scientists conduct cutting edge experiments at these particle accelerators, high-flux neutron sources, synchrotron radiation light sources, and other specialized facilities, such as the Combustion Research Facility (CRF) at Sandia National Laboratories, Livermore, California. The CRF is an internationally recognized facility for the study of combustion science and technology, which will begin its first year of operation after its Phase II development project.

The user community continues to be pleased with the results of the Science Facilities Initiative as evidenced by their many letters of support and by the positive results of surveys conducted at the facilities

The **Large Hadron Collider** - The foremost high energy physics research facility of the next decade will be the Large Hadron Collider (LHC) at CERN, the European Center for Particle Physics. The primary physics goals of the LHC will impact our understanding of the relation of mass, fundamental forces, and the structure and origin of the universe. U.S. participation in the LHC is required to provide U.S. access to the high energy frontier in order to maintain the U.S. as a world leader in this fundamental area of science.

The LHC is an outstanding example of international cooperation in large scientific projects, as well as interagency and inter-laboratory cooperation. An International Cooperation Agreement has been negotiated between CERN, DOE and NSF. The Agreement provides for U.S. participation in the construction of the accelerator, and of the two very large detectors, ATLAS and CMS. Carefully defined lists of deliverables and costs have been agreed upon for each of these areas of participation. U.S. costs are capped at $531M ($450M DOE and $81M NSF), consistent with Congressional guidance. In return, participating U.S. universities and laboratories will join, as full partners, in LHC experiments. In addition, a Memorandum of Understanding (MOU) has been executed between DOE and NSF that defines the relationship between the agencies relative to programmatic coordination of U.S. LHC activities include joint oversight and execution of the U.S. LHC Construction Program.

Under the terms of this MOU, Fermilab is the Lead Laboratory for the accelerator portion of the program, which it will execute in cooperation with Brookhaven (BNL) and Lawrence Berkeley (LBNL) National Laboratories. BNL is the host laboratory for the ATLAS portion of the program, which also involves Argonne National

Laboratory (ANL) and LBNL along with 28 university groups. Similarly, Fermilab is the host laboratory for the CMS detector portion of the program, including BNL and Los Alamos National Laboratory (LANL) along with 33 university groups. Cost and schedule baselines have been reviewed and validated for each of the three programs and management systems are in place to monitor progress against baselines.

The **Next Generation Internet** (NGI) - The program is creating the foundation for more powerful and versatile networks of the 21st century, just as previous federal investments in information technology R&D created the foundation for today's Internet. This program is critical to DOE's science and technology missions because enhancements to today's Internet from commercial R&D will not be sufficient to enable effective use of: petabyte/year High Energy and Nuclear Physics facilities such as the Relativistic Heavy Ion Collider (RHIC); to provide remote visualization of terabyte to petabye data sets from computational simulation; to develop advanced collaboratories; and to enable effective remote access to tomorrow's advanced scientific computers.

For example, typical RHIC experimental collaborations involve thousands of scientists at hundreds of institutions across the country and the world. Using the current Internet, it would take about 2,500 hours to transmit one day's data from RHIC to one remote site for analysis. Using NGI it would take 25 hours.

Thus, DOE's NGI research program is focused on discovering, understanding, developing, testing and validating the networking technologies needed to enable wide area, data intensive and collaborative computing. The DOE applications share two important characteristics. They all involve extremely large data sets and they all require that scientists be able to interact with the data in (nearly) real time. Current network technology limitations significantly limit our ability to address these characteristics.

The DOE program includes research in advanced protocols, special operating system services for very high speed, and very advanced network control, the components needed to enable wide area, data intensive and collaborative computing. In addition the DOE program addresses issues that result from the many different kinds of network devices, network-attached devices, and services that need to be integrated together. Examples of the components and services that need to be integrated include: network resources, data archives on tape, high performance disk caches, visualization and data analysis servers, authentication and security services, and the computer on a scientist's desk. This type of integration, as well as the issues of improving the performance of the individual components, all require significant research because the issues are currently not well understood. Indeed, the first identification of many of these issues is the result of previous work in collaboratories and visualization supported by DOE.

Thus, DOE's participation in the NGI builds on previous DOE research and its over two decades of success in using advanced networks as tools for science. Furthermore, the differences between the requirements of commercial networks and networks for scientific research require DOE to conduct this research because these tools and technologies will not be developed by commercial R&D. However, the results and "spinoffs" of this research, after testing and prototyping by the scientific community, will impact broad commercial use of networks. DOE's FY 2000 NGI program will build on the results of the competitive research solicitations conducted in FY 1999.

Climate Change Technology Initiative (CCTI)- Eighty-five percent of our Nation's energy results from the burning of fossil fuels, a process that adds carbon to the atmosphere. Because of the potential environmental impacts of increases in atmospheric carbon dioxide, carbon management

has become an international concern and is a focus of the CCTI.

The Office of Science is well positioned to make significant contributions to the many solutions needed to address this problem. SC can build on the fundamental discoveries of core research programs in carbon and non-carbon energy sources, carbon sequestration, and carbon recycling, extending them to the new discoveries needed to make carbon management practical and efficient.

Activities in both Basic Energy Sciences and Biological and Environmental Research support the DOE and Administration CCTI efforts in: *science for efficient technologies, fundamental science underpinning advances in all low/no carbon energy sources, and sequestration science.*

The SC portion of the CCTI leverages the foundation of excellent research already underway. The additional SC effort will also have a major impact on many scientific disciplines by advancing the state of knowledge in such fields as genome science, molecular, cellular and structural biology, biochemistry, chemical dynamics, solid state chemistry, photochemistry, ecology, nano- and meso-phase materials science, condensed matter physics, engineering, theoretical chemistry and physics.

For example, the BER microbial genome program has made significant investments in the technology that enables genome sequencing at rates previously unattainable. Capitalizing on these investments, the genomes of microbes that produce methane and hydrogen from carbonaceous sources will be sequenced as part of the first awards under CCTI. This will enable identification of key genetic components of the organisms that regulate the production of these gases. The carbon sequestration research program will focus on understanding the natural terrestrial sequestration cycle and the natural oceanic sequestration cycle as part of the first awards under the CCTI. The ultimate goal is to enhance the natural carbon cycle in both the terrestrial and oceanic systems. The search for new fuel sources and carbon sequestration research are key elements of the carbon management program.

CCTI research and related activities within the Office of Science will continue to be coordinated with the Office of Fossil Energy. FY 1999 integration efforts include the coordination of new CCTI proposal solicitations and preparation of a detailed carbon dioxide sequestration roadmap.

Genome - In only its first full year of operation, the DOE Joint Genome Institute (JGI) became the second leading public producer of high quality human DNA among U.S. sequencing centers. The JGI is boldly scaling up its sequencing capacity from 21 million finished bases in FY 1998 to 30 million finished bases and 40 million high quality draft bases in FY 1999. In total, SC will complete sequencing of 50 million finished and 70 million high quality draft subunits of human DNA to submit to publicly accessible databases in FY 2000. In addition, SC will complete the full genetic sequencing of more than 10 microbes that have significant potential for waste cleanup and energy production.

Improvements in high throughput human DNA sequencing technology and sequence data management are needed to complete the first human genome by 2003 and to efficiently and cost effectively use that sequence information for future medical diagnoses and scientific discovery. The Joint Genome Institute, in which the National Laboratories work as a system, are primarily focused on high throughput sequencing. FY 2000 is the third year of a major 3-5 year scale-up in DNA sequencing capability for this virtual institute. DOE will continue to work with the private sector, where appropriate, to accelerate progress and reduce cost in the Human Genome project.

The SC program is actively involved with other federal agencies funding, human, plant and microbial research to encourage effective and efficient management of the total federal genome research portfolio.

Recent Successes of the Office of Science:

Fueling the Future:

- Identified a major error in current models of combustion process
- Provided a realistic picture of corrosion resistance to advance protection coatings
- Created electrically conducting nano-scale ropes, 50-100 times more conductive than copper

Protecting our Living Planet:

- Research on "Conan the Bacterium" (D. Radiodurans) helps in clean-up
- Two of the 1997 "11 hottest papers in biology" were for microbial genomic sequences funded by SC
- Discovered gene for kidney disease

Exploring Energy and Matter:

- Launched the Alpha Magnetic Spectrometer experiment on the Space Shuttle to explore the mysteries of missing anti-matter and dark matter
- Established the 3-D, atom-by-atom structure of the enzyme system responsible for DNA replication
- Demonstrated that the supposedly massless neutrino must, in fact, have a non-zero rest mass.

Extraordinary Tools:

- Signed the Large Hadron Collider agreement opening the frontier of high energy physics to American researchers
- New scientific research facilities on-line: the William R. Wiley Environmental Molecular Sciences Laboratory; the Jefferson Lab's Large Acceptance Spectrometer; SLAC's B-Factory, the Oak Ridge Free-Air CO_2 Enrichment Facility and the JGI Production (DNA) Sequencing Facility.
- Projects on time and budget: Fermilab's Main Injector, the Relativistic Heavy Ion Collider, the Combustion Research Facility Phase II, and the SNS.

SC Program Direction:

- Hammer award for Environmental Management Science Program
- Jointly developed the third DOE-NIH Human Genome Five Year Plan with accelerated sequencing goals
- Acknowledged as model for facilities management by the National Academy of Public Administrators (NAPA).

In addition, hundreds of principal investigators, funded by SC, win dozens of major prizes and awards sponsored by the President, the Department, the National Academy of Sciences, the National Academy of Engineering, and the major professional societies. These include the 1997 Nobel Prize for Chemistry, the 1997 Fermi and Lawrence awards, the National Science Foundation Career Award, eight of the 1998 R&D 100 awards, 1997 Discover Awards, the 1998 Federal Laboratory Consortium Award, and the 1997 and 1998 "Top Ten Contributions to Science," reported by *Science* Magazine.

Major Program Activities for FY 2000:

The **Basic Energy Sciences** (BES) program is a principal sponsor of fundamental research for the United States in the areas of materials sciences, chemical sciences, geosciences, biosciences, and engineering sciences. This research underpins the DOE missions in energy, the environment and national security; advances energy related basic science on a broad front; and provides unique national user facilities for the scientific community. Performance measurement, dominated by peer review, helps to determine the distribution of activities supported within BES and the individual projects supported within each activity. The program funds more than 2,400 researchers at 200 institutions nationwide. Program results continue to be recognized through the receipt of major prizes and awards from the scientific community.

BES also plays a major part in the FY 2000 Office of Science initiatives described above. BES is the sole supporter of the Spallation Neutron Source construction and a major contributor to the Scientific Simulation Initiative (Combustion and Fundamental Research portions), Scientific Facilities Utilization, and the Climate Change Technology Initiative.

BES plans, constructs, and operates 18 major scientific user facilities to serve over 6,000 researchers at universities, national laboratories, and industry. These facilities enable the acquisition of new knowledge that often cannot be obtained by any other means. These facilities have an enormous impact on science and technology, ranging from determinations of the structure of superconductors and biological molecules to the development of wear-resistant prostheses; from atomic-scale characterization of environmental samples to elucidation of geological processes; and from the production of unique isotopes for cancer therapy to the development of new medical imaging technologies. As part of its commitment to excellence, BES user facilities maintain a record of less than 10 percent unscheduled downtime, on average.

Facility enhancements and maintenance activities for BES in FY 2000 will be focused on the existing high-flux neutron sources, the Los Alamos Neutron Science Center at Los Alamos National Laboratory and the High Flux Isotope Reactor at Oak Ridge National Laboratory. These improvements, recommended by the Basic Energy Sciences Advisory Committee, will substantially increase the neutron flux and instrument capabilities available to the scientific community. BES is committed to keeping the development and upgrade of scientific user facilities, including the construction of the Spallation Neutron Source, on schedule and within cost, not to exceed 110 percent of estimates.

Within the base research effort, the program in Complex and Collective Phenomena, started in FY 1999, will continue to support work at the frontiers of basic research that hold the promise of delivering revolutionary breakthroughs. This effort is designed to obtain fundamental knowledge of increasingly complex systems in order to help bridge the gap in our understanding between the atomic and molecular properties and the bulk structural and mechanical properties of materials, for example. In addition, BES will continue its Partnership for Academic-Industrial Research (PAIR) program to facilitate research partnerships between academic researchers, their students, and industrial researchers.

The **Biological and Environmental Research** (BER) program in FY 2000 will focus on sequencing the human genome, microbial genome research, low dose exposure research, environmental processes research with an emphasis on global environmental change, environmental remediation research, and radiopharmaceutical research, structural biology, and molecular nuclear medicine.

Last year, *Science* magazine identified genomic sequencing as one of the top ten breakthroughs in science. BER's Microbial Genome Program supported the complete genomic sequencing of 6 of the 18 bacteria sequenced with at least 12 more in progress. Microbial genome research continues to sequence microbes relevant to DOE mission needs including work in three main areas: (1) microbial diversity, to identify potentially useful microbes, (2) new DNA sequencing strategies to rapidly and cost effectively determine the sequence of closely related microbes, and (3) novel strategies and tools for characterizing, manipulating, and modeling entire reaction pathways or gene regulatory networks. Microbes are used as models to understand more complex biology and to advance sequencing tools.

In FY 2000, human DNA sequencing continues to ramp up. The DOE Joint Genome Institute will sequence 50 million finished bases and 70 million high quality draft bases of human DNA.

Radiopharmaceutical research and molecular nuclear medicine will continue to develop more specific and sensitive radiopharmaceutical tracers and develop sensitive imaging technology that will impact clinical medicine. Positron Emission Tomography (PET) technology, developed previously in this program, will be used to elucidate complex biomedical problems such as the neurochemical basis of addictive and neurodegenerative diseases. Recent work has shown damage to the brain function in persons addicted to drugs, such as cocaine, that reinforces the craving for these drugs. The Boron Neutron Capture Therapy Program will complete Phase I trials to determine an effective and safe treatment dose and initiate a Phase II efficacy trial. BER will continue to exploit the unique capabilities of the National Laboratories in a national biomedical engineering program to develop novel medical technologies.

In FY 2000, The Atmospheric Radiation Measurement facility will begin operations of the third climate observatory in the Tropical Western Pacific on Christmas Island, thus completing the span of observatories across the Pacific warm pool. Valuable data will result for climate model development and improvement.

The Free Air Carbon Dioxide Enrichment (FACE) experiment will continue tree growth and physiological observations, including studies of ecosystem processes. FACE technologies have achieved international recognition, with FACE facilities developing in Europe and Panama. FACE has observed the effect of increased atmospheric concentrations of carbon dioxide on tree growth and physiology.

BER facilities in support of fundamental science to underpin environmental cleanup continue to have an impact. After its first full year of operation in 1998, the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) had already attracted nearly 600 outside users and collaborators from government laboratories, private industry, and academia. Interactions between EMSL and the Natural and Accelerated Bioremediation Research (NABIR) program will be strengthened, to provide unifying research facilities for academic and laboratory investigators in the fields contributing to bioremediation research.

BER also plays a major part in the FY 2000 Office of Science initiatives described above. BER is the primary supporter of SC Genome research, and a major contributor to SSI (Global Systems and Fundamental Research portions), Scientific Facilities Utilization, and the CCTI.

The **High Energy Physics** (HEP) program will continue to address new and exciting research at the forefront of particle physics.

At Fermilab, the newly upgraded D-Zero and CDF detectors will be moved into position at the Tevatron; and they, along with the newly commissioned Main Injector, will be used for the first time for antiproton-proton collisions. The Main Injector will increase the luminosity of the

Tevatron by a factor of 5. Also at Fermilab, the NuMI/ MINOS neutrino oscillation project will be well underway with construction of conventional facilities and technical components; and the Wilson Hall Safety Improvements Project will be progressing well in its second year of physical construction with completion scheduled for 2002.

SLAC's newly commissioned B-factory, a collaboration among SLAC, Lawrence Berkeley National Laboratory, and Lawrence Livermore National Laboratory, will be in its first full year of operation with its primary goal to obtain high luminosity to begin the study of CP-violation (matter-antimatter asymmetry). Also at SLAC, physical construction on a new office building for B-factory users will begin.

As planned, the Alternating Gradient Synchrotron (AGS) at Brookhaven was transferred to the Nuclear Physics program for use as an injector for RHIC. Therefore, use of the AGS for high energy physics in FY 2000 will be on an incremental cost basis. AGS runs, necessary to achieve the precision measurement of the muon g-2 anomalous magnetic moment, will continue in FY 2000.

The fabrication of components for the LHC project continues in FY 2000. Fermilab is the host and lead laboratory for the U.S. efforts on the CMS detector as well as host and lead laboratory, with the assistance of Brookhaven and Lawrence Berkeley, on the U.S. accelerator efforts. Similarly, Brookhaven is the host and lead laboratory for the U.S. efforts on the ATLAS detector.

In addition, R&D on accelerator concepts for future large accelerator facilities will continue in FY 2000. Consistent with recent HEP Advisory Panel recommendations, modest increases are planned for high energy physics university groups in FY 2000 to allow them to exploit new facilities mentioned above.

The **Nuclear Physics** (NP) program provides primary support in the U.S. for fundamental research on the structure and fundamental forces in atomic nuclei. The Program operates large and small particle accelerator facilities located at National Laboratories and Universities which provide the microscopic probes of these structures and forces. The scope of the FY 2000 Nuclear Physics Program is broadly enhanced by operation of several new facilities. The new Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory will operate for its first full year to search for the predicted quark-gluon plasma, a heretofore unseen form of nuclear matter. The new Thomas Jefferson National Accelerator Facility in Newport News, Virginia, is fully operational, and will continue an already impressive program of research into the quark basis of the structure of nuclei. The Sudbury Neutrino Observatory (SNO) in Canada will be fully operational in FY 2000 and will be accumulating important information on the apparent low rate of neutrino flux from the sun. R&D and conceptual design development for a proposed world-class radioactive ion beam facility (ISOL) for nuclear structure and astrophysics studies, will be supported in FY 2000. A smaller radioactive ion beam facility (RIB) has recently begun to operate at Oak Ridge National Laboratory, and is prototyping new radioactive beam techniques as well as doing research.

Unique low energy heavy ion facilities at ANL and LBNL, will continue to pursue important investigations of highly deformed and exotic nuclei which require examination using very high resolution spectroscopy. The new and highly successful Gammasphere detector is being utilized at both ANL and LBNL to pursue such experiments. The MIT/Bates Linear Accelerator Center, which has been a major world center for nuclear research using electron scattering for over 25 years, will end operations in FY 2000.

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The **Fusion Energy Sciences** (FES) program is completing its transition from a focus on the development of fusion as a new energy supply technology to emphasizing the science that underpins fusion energy. In FY 2000, the program will continue to make progress in understanding plasma physics, identifying and exploring innovative approaches to fusion power, and exploring the science and technology of energy producing plasmas, as a partner in the international fusion research effort.

FY 2000 will begin a three year effort, supported by FES, at the Princeton Plasma Physics Laboratory (PPPL) for the decontamination and decommissioning of the Tokamak Fusion Test Reactor (TFTR).

The program continues the move toward innovation and increased understanding of a wide range of confinement concepts. The National Spherical Torus Experiment (NSTX) facility provides strong support of the goal to explore innovative and more affordable development paths. Work on concept improvement at the exploratory level in both physics and enabling technology R&D will receive more emphasis. The inertial fusion energy element will be broadened to include research efforts on systems and related elements. This change in domestic program emphasis reflects a move away from the costly, large scale devices aimed at providing integrated plasma technology experiments operating with power plant-scale plasma parameters.

The International effort to explore the science and technology of energy producing plasmas was dramatically reduced in FY 1999 by termination of U.S. participation in the International Thermonuclear Experimental Reactor (ITER) project. The U.S. will, however, continue to pursue modest scale international collaborative activities on major international scientific facilities.

Research on high temperature toroidal plasmas will be carried out using the DIII-D facility at General Atomics, C-MOD at MIT and NSTX spherical torus at PPPL which will have its first full year of operations in FY 2000. The experimental program will be supported by broadly based theoretical, modeling and computational efforts. Technology activities supporting energy-producing plasmas will be drastically reduced as part of the shift in priorities noted above, but the long range program on low activation materials will continue. The physical and intellectual infrastructure associated with the experimental portion of energy producing plasmas will need to be re-established at an appropriate time depending upon technical advances toward lower-cost systems and/or increased urgency.

As recommended by Congress, a review of the several approaches to fusion (to be conducted by the Secretary of Energy Advisory Board) was initiated in December, 1998 and will be completed in May 1999. The National Academy of Sciences is also expected to complete a review of the fusion science program in FY 1999. Recommendations from these reviews will help to set the course for future fusion research activities.

The **Computational and Technology Research** (CTR) program supports advanced computing research — applied mathematics, high performance computing, networking, and operates supercomputer and associated facilities that are available to researchers 24 hours a day, 365 days a year. The combination of support for fundamental research, computational and networking tools development, and high-performance computing facilities provides scientists with the capabilities to analyze, model, simulate, and — most importantly — predict complex phenomena of importance to the Office of Science and the Department of Energy.

The long history of CTR accomplishments continued in FY 1999 including: the 1998 Gordon Bell Prize for Best Performance of a

Supercomputing Application, the 1998 IEEE Fernbach Award for outstanding contribution in the application of high performance computers using innovative approaches and four R&D 100 Awards to CTR researchers in areas ranging from parallel numerical libraries to near frictionless coatings.

Experiments at Office of Science facilities may generate millions of gigabytes (petabytes) of data per year (which would fill the disk drives of millions of today's personal computers) presenting significant computational and communications challenges in analyzing and extracting information from the data.

Some of the pioneering accomplishments of this program are: development of the technologies to enable remote, interactive access to supercomputers; research and development leading to the High Performance Parallel Interface (HiPPI) standard; and research leading to the development of the slow start algorithm for the Transmission Control Protocol (TCP), which enabled the Internet to scale to today's worldwide communications infrastructure.

CTR is responsible for DOE participation in the Next Generation Internet (NGI) program to create the foundation for more powerful and versatile networks of the 21st century.

CTR also heads the Department's Scientific Simulation Initiative (SSI) as a joint program with the other program offices in SC. CTR's role in the SSI includes management of the selection process for a small number of basic science application efforts initiated in FY 2000, management of the SSI Advanced Computing and Communications Facilities, and management of the Computer Science and Enabling Technology component.

In addition to these computing related activities CTR also manages the Laboratory Technology Research (LTR) program for the Office of Science. The mission of this program is to support high risk, energy related research that advances science and technology to enable applications that could significantly impact the Nation's energy economy. LTR fosters the production of research results motivated by a practical energy payoff through cost-shared collaborations between Office of Science laboratories and industry.

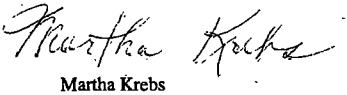
The Science **Program Direction** budget funds staff and related expenses which are necessary to provide overall management direction of the Office of Science research programs. The Office of Science will strive to meet staffing levels as outlined in its Workforce Management Plan. Work will continue on piloting the transfer of management responsibility of newly generated wastes at SC sites from Environmental Management to the Office of Science. The scientific and technological challenges of the Department's missions demand an adequate supply of scientists, engineers and technicians. For over 50 years, DOE and its predecessor agencies have supported science and engineering education programs involving university faculty as well as pre-college teachers and students. Tapping the significant human and physical resources of the DOE National Laboratories is perhaps the most distinguishing feature of the agency's contribution to science education. Within the FY 2000 request for Program Direction is SC's core program for science education, supporting such activities as: the Undergraduate Research Fellowship Program, the National Science Bowl, and Albert Einstein Distinguished Educator Fellowship. In addition, two new initiatives, developed in partnership with NSF, will be supported through the five SC scientific programs. The first initiative will be focused on providing pre-college science and math teachers with research opportunities that will improve their knowledge and skills of scientific discovery and enhance their ability to apply them in their classrooms. The second initiative will allow university faculty and undergraduate student teams to participate in long-term research projects at DOE Laboratories. Historically, over two-thirds of undergraduates who have participated in DOE programs have gone on to graduate school in disciplines directly related to DOE missions.

These activities will help to fulfill SC's responsibilities in developing the next generation of scientists and engineers in a responsible and focused manner.

Effective human resource management will ensure that critical staffing needs are met in support of the strategic goals of the Department. This includes, but is not limited to, the integration of diversity considerations into all human resource management activities, and effective long-term succession planning for executives and scientific/ technical positions. Enhanced business processes that are built from our Activity Based Management activities and Strategic Information Planning will enable the staff to carry out the mission and functions of the organization effectively and efficiently.

Closing:

The significant increase in the FY 2000 budget for the Office of Science recognizes the critical role that fundamental knowledge plays in achieving the DOE missions and for the general advance of the Nation's economy and the welfare of its citizens. The Scientific Simulation Initiative represents a major investment in producing the necessary scientific computation and information infrastructure for DOE science applications as part of a multi-agency initiative. This request will also provide the U.S. scientific community with increased research capability and new opportunities at the DOE scientific user facilities, including progress on SNS, a new forefront neutron source, and upgrades of existing facilities. On behalf of the Administration and the Department, I am pleased to present this budget for the Office of Science and welcome the challenge to deliver results.



Martha Krebs
Director
Office of Science

Table I

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
Science			
Basic Energy Sciences	651,816	799,524	888,084
Computational and Technology Research	146,779	157,471	198,875
Biological and Environmental Research	395,676	436,688	411,170
Fusion Energy Sciences	224,190	222,636	222,614
High Energy Physics	668,590	695,526	697,090
Nuclear Physics	314,738	334,555	342,940
Energy Research Analyses	1,434	1,000	1,000
Multiprogram Energy Laboratories-Facilities Support	21,247	21,260	21,260
Science Program Direction	37,600	49,800	52,360
Small Business Innovation Research and Small Business Technology Transfer	80,730	——	——
Subtotal	2,542,800	2,718,460	2,835,393
General Reduction for Use of Prior Year Balances	-15,295	-13,000	——
Superconducting Super Collider	-35,000	-7,600	——
Total	2,492,505	2,697,860	2,835,393
Energy Supply R&D			
Technical Information Management	10,100	8,600	9,100
General Reduction for Use of Prior Year Balances	-68	-191	——
Total	10,032	8,409	9,100

Table 2

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
Global Climate Change	105,780	113,865	124,838
Climate Change Technology Initiative	——	13,500	33,000
Partnership for New Generation of Vehicles	5,000	5,000	5,000
Science and Education Programs	——	4,500	14,235
Strategic Simulation Initiative	——	——	70,000

Table 3

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
AMES LABORATORY			
Basic Energy Sciences	18,659	17,114	16,967
Biological and Environmental Research	766	631	500
Computational and Technology Research	2,290	1,939	1,490
High Energy Physics	——	——	219
Total Laboratory	21,715	19,684	19,176
ARGONNE NATIONAL LABORATORY			
Basic Energy Sciences	139,894	143,436	145,096
Biological and Environmental Research	11,278	9,181	13,476
Computational and Technology Research	16,869	15,430	8,187
Fusion Energy Sciences	2,835	2,540	2,135
High Energy Physics	9,512	8,825	9,040
Multiprogram Energy Labs-Facilities Support	10,892	7,089	4,980
Nuclear Physics	16,845	16,045	17,485
Total Laboratory	208,125	202,546	200,399
BROOKHAVEN NATIONAL LABORATORY			
Basic Energy Sciences	76,722	77,586	77,331
Biological and Environmental Research	26,501	22,142	19,228
Computational and Technology Research	2,843	1,457	2,589
Fusion Energy Sciences	50	——	——
High Energy Physics	86,774	62,813	32,769
Multiprogram Energy Labs-Facilities Support	568	1,349	6,881
Nuclear Physics	110,851	115,900	135,549
Total Laboratory	304,309	281,247	274,347

Table 3

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY			
Basic Energy Sciences	200	—	—
Computational and Technology Research	190	100	283
Nuclear Physics	68,850	70,305	73,669
Total Laboratory	69,240	70,405	73,952
FERMI NATIONAL ACCELERATOR LABORATORY			
Computational and Technology Research	100	50	332
High Energy Physics	278,873	283,301	291,788
Total Laboratory	278,973	283,351	292,120
IDAHO NATIONAL ENGINEERING LABORATORY			
Basic Energy Sciences	3,478	3,609	3,020
Biological and Environmental Research	2,158	2,034	1,736
Fusion Energy Sciences	4,120	1,740	1,000
Nuclear Physics	90	80	80
Total Laboratory	9,846	7,463	5,836
LAWRENCE BERKELEY NATIONAL LABORATORY			
Basic Energy Sciences	62,160	62,553	62,095
Biological and Environmental Research	34,358	31,587	29,003
Computational and Technology Research	57,916	53,938	49,377
Energy Research Analyses	100	—	—
Fusion Energy Sciences	3,947	5,334	5,255
High Energy Physics	26,869	24,492	35,532
Multiprogram Energy Labs-Facilities Support	2,400	4,854	6,133
Nuclear Physics	21,965	22,118	18,080
Total Laboratory	209,715	204,876	205,475

Table 3

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
LAWRENCE LIVERMORE NATIONAL LABORATORY			
Basic Energy Sciences	5,933	6,044	5,236
Biological and Environmental Research	30,004	36,148	28,446
Computational and Technology Research	2,755	2,940	640
Fusion Energy Sciences	10,518	11,158	10,168
High Energy Physics	1,794	685	680
Nuclear Physics	845	660	950
Total Laboratory	51,849	57,635	46,120
LOS ALAMOS NATIONAL LABORATORY			
Basic Energy Sciences	23,613	24,673	25,906
Biological and Environmental Research	19,661	20,651	18,251
Computational and Technology Research	14,614	13,034	10,894
Fusion Energy Sciences	4,143	4,219	4,419
High Energy Physics	1,090	650	790
Nuclear Physics	10,783	9,750	10,260
Total Laboratory	73,904	72,977	70,520
OAK RIDGE NATIONAL LABORATORY			
Basic Energy Sciences	110,219	217,848	302,898
Biological and Environmental Research	25,422	21,617	19,153
Computational and Technology Research	19,434	10,415	6,876
Energy Research Analyses	665	——	400
Fusion Energy Sciences	17,870	17,480	15,866
High Energy Physics	772	240	240
Multiprogram Energy Labs-Facilities Support	7,387	6,808	2,106
Nuclear Physics	16,215	15,017	16,665
Total Laboratory	197,984	289,425	364,204

Table 3

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
PACIFIC NORTHWEST NATIONAL LABORATORY			
Basic Energy Sciences	12,868	12,788	12,947
Biological and Environmental Research	77,466	73,913	70,434
Computational and Technology Research	4,188	3,238	3,584
Energy Research Analyses	——	——	250
Fusion Energy Sciences	1,415	1,410	1,430
High Energy Physics	10	10	10
Total Laboratory	95,947	91,359	88,655
NATIONAL RENEWABLE ENERGY LABORATORY			
Basic Energy Sciences	4,515	4,193	3,744
Biological and Environmental Research	250	——	——
Computational and Technology Research	498	127	——
Total Laboratory	5,263	4,320	3,744
PRINCETON PLASMA PHYSICS LABORATORY			
Basic Energy Sciences	700	675	——
Computational and Technology Research	90	121	332
Fusion Energy Sciences	49,612	50,332	58,979
High Energy Physics	80	120	534
Total Laboratory	50,482	51,248	59,845
SANDIA NATIONAL LABORATORY			
Basic Energy Sciences	28,764	26,600	22,008
Biological and Environmental Research	3,486	3,239	2,903
Computational and Technology Research	5,232	5,293	3,779
Fusion Energy Sciences	5,850	4,115	3,565
Total Laboratory	43,332	39,247	32,255

Table 3

OFFICE OF SCIENCE
FY 2000 PRESIDENT'S BUDGET REQUEST TO CONGRESS
(B/A in thousands of dollars)

Major Site Funding	FY 1998 Current Approp.	FY 1999 Current Approp.	FY 2000 Request
STANFORD LINEAR ACCELERATOR CENTER			
Basic Energy Sciences	21,684	22,686	21,968
Computational and Technology Research	980	357	782
Biological and Environmental Research	3,323	2,450	2,550
Fusion Energy Sciences	50	50	50
High Energy Physics	147,502	145,017	150,231
Nuclear Physics	9	——	——
Total Laboratory	173,548	170,560	175,581

High Energy Physics

Program Mission

The High Energy Physics (HEP) program of the Department of Energy (DOE) has the lead responsibility for Federal support of high energy physics research and supports fundamental research activities under the mandate provided in Public Law 95-91 which established the Department. The High Energy Physics program is a key element in the Science and Technology component of the DOE Strategic Plan, supporting several of the strategies which make up that component. This program is also one of the identified elements in the Secretary's Performance Agreement with the President, and is an integral part of the Department's fundamental research mission. The program is directed at understanding the nature of matter and energy at the most fundamental level, and the basic forces which govern all processes in nature. Fundamental research provides the necessary foundation that ultimately enables the Nation to progress in its science and technology capabilities, to advance its industrial competitiveness, and to discover new and innovative approaches to our energy future.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goal

Provide new insights into the nature of energy and matter to better understand the natural world.

Program Objectives

- *To continue to support high quality research* — Support high quality university and laboratory based high energy physics research, both theoretical and experimental. Experimental research is primarily performed by university scientists using particle accelerators located at major laboratories in the U.S. and abroad.
- *To effectively operate the department's high energy physics accelerator facilities* — Provide optimal and cost effective operation for research of the Fermi National Accelerator Laboratory, and the Stanford Linear Accelerator Center. The Alternating Gradient Synchrotron complex at the Brookhaven National Laboratory will be transferred to the Nuclear Physics (NP) program during FY 1999.
- *To continue to provide world class research facilities* — Plan for and build new, state-of-the-art research facilities that allow researchers to advance the forefront of the science of high energy physics. Support essential improvements and upgrades at the major accelerator laboratories. Manage the commissioning of the Fermilab Main Injector project, the initial operation of the B-factory at SLAC and the continuation of the new experimental facility at Fermilab called Neutrinos at the Main Injector (NuMI).

- *To continue to provide the program's technological base* — Support long-range accelerator and detector R&D required to provide the advanced concepts and technologies which are critical to the long-range viability of high energy physics research.
- *To continue to pursue international collaboration on large high energy physics projects* — Work to put into place the management and control systems needed to successfully carry out the planned and agreed to collaboration with CERN on the Large Hadron Collider (LHC) project. Work to explore and pursue other opportunities for effective and beneficial international collaborative activities.

Scientific Facilities Utilization

The High Energy Physics request includes $439,814,000 to maintain support of the Department's scientific user facilities. This investment will provide significant research time for thousands of scientists in universities, and other Federal laboratories. It will also leverage both Federally and privately sponsored research, consistent with the Administration's strategy for enhancing the U.S. National science investment. The proposed funding will support operations at the Department's two major high energy physics facilities: the Tevatron at Fermilab, and the B-factory at the Stanford Linear Accelerator Center (SLAC), and on an incremental basis will provide support for limited operation of the Alternate Gradient Synchrotron (AGS) at the Brookhaven National Laboratory (BNL), which is primarily being operated as part of the Nuclear Physics (NP) funded Relativistic Heavy Ion Collider (RHIC) complex.

Performance Measures

Performance measures related to basic science activities are primarily qualitative rather than quantitative. The scientific excellence of the High Energy Physics program is continually reevaluated through the peer review process. Some specific performance measures are:

- Quality of scientific results and plans as indicated by expert advisory committees, recognition by the scientific community, and awards received by DOE-supported High Energy Physics researchers. The results of these reviews and other quality measures will be used to determine programmatic directions aimed at maintaining the world leadership position of the U.S. high energy physics program.
- Sustained achievement in advancing knowledge, as measured by the quality of the research based on results published in refereed scientific journals, and by the degree of invited participation at national and international conferences and workshops.
- Operation of research facilities in a manner that meets user requirements, as indicated by achieving performance specifications while protecting the safety of the workers and the environment, and by the level of endorsement by user organizations; operating facilities that are used for research at the forefront of science; and operating facilities reliably and according to planned schedules.
- Progress on the Neutrinos at the Main Injector project as measured by accomplishment of scheduled milestones; progress on achieving luminosity and operational efficiency for the B-factory at SLAC as measured by comparison with stated project goals.
- Progress on achieving luminosity and operational efficiency for the Tevatron at Fermilab in its new mode of operation with the recently completed Main Injector.

- The upgrade of scientific facilities will be managed to keep them on schedule and within cost.
- High Energy Physics will begin operating the B-factory at SLAC, the Main Injector for the Tevatron at Fermilab, and will deliver on the FY 2000 U.S./DOE commitments to the international Large Hadron Collider project.
- Review at least 80 percent of the research projects by appropriate peers and selected through a merit-based competitive process.
- Continue collaborative efforts with NASA on space science.

Significant Accomplishments and Program Shifts

- Completion of a long range planning study of the High Energy Physics program was accomplished by a Subpanel of the High Energy Physics Advisory Panel (HEPAP), (Gilman report). Their report is entitled "Planning for the Future of U.S. High-Energy Physics." The Subpanel's recommendations were considered carefully in preparing this budget.

Research and Technology

- Measurement, by teams of university and laboratory scientists working at Fermilab, of the mass and production properties of the top quark was accomplished. This is the last, and by far the heaviest, of the fundamental building blocks of matter (quarks) whose existence was predicted by the Standard Model of elementary particles. The mass of the top quark is now measured more accurately than any of the other quarks.
- The world's most precise measurement was made, by a team of university and laboratory scientists working at Fermilab, of the mass of the W boson. This result is considerably more precise than the best measurement from LEP.
- The world's highest precision single measurement was made by a group of university and laboratory scientists working at SLAC, of the weak mixing angle, a fundamental parameter of the Standard Model.
- The observation was made, by the CDF collaboration working at Fermilab, of the B meson containing a charmed quark. This discovery completes the theoretically predicted family of B mesons.
- The observation was made for the first time ever by the kTeV collaboration of the predicted decay of the kaon into a pair of pions and an electron-positron pair.
- A major advance in theoretical physics was achieved when it was shown and verified that all of the known "string" theories are equivalent. This greatly reduces the number of possible theories which describe all of the known forces including gravity.
- A test of a superconducting accelerator-style magnet fabricated at Lawrence Berkeley National Laboratory (LBNL) achieved a new world record field strength of 13.5 teslas (previous record 11 teslas.) This is a significant accomplishment in the effort to advance technology for future accelerators.
- At the g-2 experiment at BNL, designed to study the magnetic properties of the muon and to develop a more precise measurement of the anomalous magnetic moment, initial data collection has been

completed. Once data collection has been completed, the analysis of these data should become available over the next three years. The experimenters are confident that they will achieve the world's best measurement of the anomalous magnetic moment of the muon. If the final result agrees with the standard model, it will place significant new limits on physics beyond the standard model.

Facility Operations

- The final data collection with the Fermilab 800 GeV fixed-target program will be completed in FY 2000, and the prime focus of the Fermilab program will turn to research using the Tevatron collider with the higher luminosity of the new Main Injector.
- The Alternating Gradient Synchrotron at BNL will be transferred to the Nuclear Physics program for operation as the injector for the RHIC facility during the 3rd quarter of FY 1999. Beginning in FY 2000, use of the AGS for High Energy Physics experiments will be on an incremental cost basis.
- The European Center for Nuclear Research (CERN) in Geneva, Switzerland has initiated the Large Hadron Collider (LHC) project. This will consist of a 7 on 7 TeV proton-proton colliding beams facility to be constructed in the existing Large Electron-Positron Collider (LEP) machine tunnel (LEP will be removed). The LHC will have an energy 7 times that of the Tevatron at Fermilab. Thus the LHC will open up substantial new frontiers for scientific discovery.

  The Project is proceeding well. All the civil engineering contracts have been awarded and work is underway and proceeding on schedule. Work is underway for the ATLAS detector hall, for the CMS detector hall, for a beam transfer line tunnel on the Swiss side, and for a second beam transfer line tunnel together with enlargements of the main tunnel on the French side. In addition, CERN has completed approximately 700 million Swiss francs worth of contracting for the collider, which is a significant portion of the total project budget. This includes orders placed with three companies, German, Italian and French, for two full-length collider dipole magnets from each, with an option for a third.

  Participation by the U.S. in the LHC program is extremely important to U.S. High Energy Physics program goals. The LHC will become the foremost high energy physics research facility in the world around the middle of the next decade. With the LHC at the next energy frontier, American scientific research on that frontier depends on participation in LHC. The High Energy Physics Advisory Panel (HEPAP) Subpanel on Vision for the Future of High-Energy Physics (Drell) strongly endorsed participation in the LHC, and this endorsement has been restated by HEPAP on several occasions.

  The physics goals of the LHC include a search for the origin of mass as represented by the "Higgs" particle, exploration in detail of the structure and interactions of the top quark, and the search for totally unanticipated new phenomena. Although LHC will have a lower energy than the Superconducting Super Collider (canceled in 1993), it has strong potential for answering the question of the origin of mass. The LHC energies are sufficient to test theoretical arguments for a totally new type of matter. In addition, history shows that major increases in the particle energy nearly always yield unexpected discoveries.

  DOE and NSF have entered into an agreement with CERN about contributions to the LHC accelerator and detectors as part of the U.S. participation in the LHC program to provide access for U.S. scientists to the next decade's premier high energy physics facility. The resulting agreements were approved by CERN, the DOE and the NSF and were signed in December of 1997.

Participation in the LHC project (accelerator and detectors) at CERN will primarily take the form of the U.S. accepting responsibility for designing and fabricating particular subsystems of the accelerator and of the two large detectors. Thus, much of the funding will go to U.S. laboratories, university groups, and industry for fabrication of subsystems and components which will become part of the LHC accelerator or detectors. A portion of the funds will be used to pay for purchases by CERN of material needed for construction of the accelerator. As a result of the negotiations, CERN has agreed to make these purchases from U.S. vendors.

The agreement provides for a U.S. DOE contribution of $450,000,000 to the LHC accelerator and detectors over the period FY 1996 through FY 2004 (with approximately $81,000,000 being provided by the NSF). The DOE contribution is broken down as follows: detectors $250,000,000; accelerator $200,000,000 (including $90,000,000 for direct purchases by CERN from U.S. vendors and $110,000,000 for fabrication of components by U.S. laboratories).

The total cost of the LHC on a basis comparable to that used for U.S. projects is estimated at about $6,000,000,000. Thus the U.S. contribution represents less than 10 percent of the total. (The LHC cost estimates prepared by CERN, in general, do not include the cost of permanent laboratory staff and other laboratory resources used to construct the project.) Neither the proposed U.S. DOE $450,000,000 contribution nor the estimated total cost of $6,000,000,000 include support for the European and U.S. research physicists working on the LHC program.

The agreement negotiated with CERN provides for U.S. involvement in the management of the project through participation in key management committees (CERN Council, CERN Committee of Council, LHC Board, etc.). This will provide an effective base from which to monitor the progress of the project, and will help ensure that U.S. scientists have full access to the physics opportunities available at the LHC. The Office of Science has conducted a cost and schedule review of the entire LHC project and similar reviews of the several proposed U.S. funded components of the LHC. All of these reviews concluded the costs are properly estimated and that the schedule is feasible.

In addition to the proposed U.S. DOE $450,000,000 contribution and $81,000,000 NSF contribution to the LHC accelerator and detector hardware fabrication, U.S. participation in the LHC will involve a significant portion of the U.S. High Energy Physics community in the research program at the LHC. This physicist involvement has already begun. Over 500 U.S. scientists have joined the U.S.-ATLAS detector collaboration, the U.S.-CMS detector collaboration, or the U.S.-LHC accelerator consortium, and are hard at work helping to design the initial physics research program to be carried out at the LHC helping to specify the planned physics capabilities of the LHC accelerator and detectors, and helping to design and fabricate accelerator and detector components and subsystems.

Fabrication of LHC subsystems and components by U.S. participants began in FY 1998. Funding was provided in FY 1996 ($6,000,000) and FY 1997 ($15,000,000) for preliminary R&D, design and engineering work on the subsystems and components being proposed for inclusion in the agreement with CERN. This funding was essential in order to provide the cost and technical bases for the proposed U.S. responsibilities in LHC, and to be ready for rapid start to satisfy the anticipated timetable for the project. Funding in the amount of $35,000,000 was provided in FY 1998, $65,000,000 will be provided in FY 1999, and $70,000,000 in FY 2000 to support continuation of these R&D and design efforts, and the continuation of fabrication of those subsystems and components specified in the agreements with CERN.

The planned U.S. funding for the LHC project is summarized below.

U.S. LHC Accelerator and Detector Funding

(dollars in thousands)

Fiscal Year	Department of Energy			National Science Foundation[a]
	Accelerator	Detector	Total	
1996 [b]	2,000	4,000	6,000	0
1997 [b]	6,670	8,330	15,000	0
1998 [b]	14,000	21,000	35,000	0
1999	29,740	35,260	65,000	22,150
2000	31,200	38,800	70,000	15,900
2001	32,060	37,940	70,000	16,370
2002	31,200	38,800	70,000	16,860
2003	29,000	36,000	65,000	9,720
2004	24,130	29,870	54,000	0
Total	200,000 [c]	250,000	450,000	81,000

This estimated annual funding profile is based on the needs of the LHC project and is consistent with flat out year funding for the High Energy Physics program. The profile is subject to change as additional planning detail is derived. The total of $450,000,000 from DOE for the project is firm.

Construction

- The Fermilab Main Injector Project is proceeding well and is within the planned cost and schedule profiles. All relevant milestones have been met. At the end of FY 1998, the construction phase of the project was nearly complete and commissioning was underway.
- The C-Zero Experimental Hall project at Fermilab will provide a new underground experimental area at the C-Zero location on the Tevatron ring. When completed in FY 1999, this will provide space for a new program of fixed target and modest sized collider experiments now being planned at Fermilab.
- The B-factory Project at SLAC will be completed within the planned cost and schedule profiles. At the end of FY 1998, the project was essentially complete and commissioning was underway. The physics research program, using the BaBar detector will begin during FY 1999.
- The Wilson Hall Safety Improvements Project is proceeding well. An economical, safe and effective method for repairing the structural beams has been developed and detailed planning and contracting is underway.

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[a] The NSF funding has been approved by the National Science Board.

[b] The FY 1996 and FY 1997 funding was for R&D, design and engineering work in support of the proposed U.S. participation in LHC. Beginning in FY 1998 funding was used for: fabrication of machine and detector hardware, supporting R&D, prototype development, and purchases by CERN from U.S. vendors.

[c] Includes $110,000,000 for LHC supporting R&D and accelerator components to be fabricated by U.S. laboratories and $90,000,000 for purchases by CERN from U.S. vendors.

Funding of Contractor Security Clearances

In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $373,000 and $270,000 for estimated contractor security clearances in FY 1999 and FY 2000, respectively, within this decision unit.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
High Energy Physics					
Research and Technology	209,128	215,865	-974	214,891	227,190
Facility Operations	408,612	459,635	0	459,635	441,200
Subtotal, High Energy Physics	617,740	675,500	-974	674,526	668,390
Construction	50,850	21,000	0	21,000	28,700
Subtotal, High Energy Physics	668,590	696,500	-974	695,526	697,090
Use of Prior Year Balances	-1,851 [a]	-1,610 [a]	0	-1,610 [a]	0
General Reduction	0	-974	+974	0	0
Total, High Energy Physics	666,739 [b]	693,916	0	693,916	697,090

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Excludes $12,833,000 which has been transferred to the SBIR program and $770,000 which has been transferred to the STTR program.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	%Change
Albuquerque Operations Office					
Los Alamos National Laboratory	1,090	650	790	+140	+21.5%
Chicago Operations Office					
Ames Laboratory	0	0	219	+219	+100.0%
Argonne National Laboratory	9,512	8,625	9,040	+215	+2.4%
Brookhaven National Laboratory	86,774	62,813	32,769	-30,044	-47.8%
Fermi National Accelerator Laboratory	278,873	283,301	291,788	+8,487	+3.0%
Princeton Plasma Physics Laboratory	80	120	534	+414	+345.0%
Total, Chicago Operations Office	375,239	355,059	334,350	-20,709	-5.8%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	26,869	24,492	35,532	+11,040	+45.1%
Lawrence Livermore National Laboratory	1,794	685	680	-5	-0.7%
Stanford Linear Accelerator Center	147,502	145,017	150,231	+5,214	+3.6%
Total, Oakland Operations Office	176,165	170,194	186,443	+16,249	+9.5%
Oak Ridge Operations Office					
Oak Ridge Institute for Science Education	230	100	489	+389	+389.0%
Oak Ridge National Laboratory	772	240	240	0	0.0%
Total, Oak Ridge Operations Office	1,002	340	729	+389	+114.4%
Richland Operations Office					
Pacific Northwest National Laboratory	10	10	10	0	0.0%
All Other Sites [a]	115,084	169,273	174,768	+5,495	+3.2%
Subtotal, High Energy Physics	668,590	695,526	697,090	+1,564	+0.2%
Use of prior year balances	-1,851 [b]	-1,610 [b]	0	+1,610 [b]	+100.0%
Total, High Energy Physics	666,739 [c]	693,916	697,090	+3,174	+0.5%

[a] Funding provided to universities, industry, other federal agencies and other miscellaneous contractors.

[b] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[c] Excludes $12,833,000 which has been transferred to the SBIR program and $770,000 which has been transferred to the STTR program.

Site Description

Ames Laboratory

Ames Laboratory is a Mulitiprogram Laboratory located on 10 acres in Ames, Iowa. Educational activities supported at the laboratory are directed towards providing opportunities for pre-college teachers that will participate directly in cutting-edge research at DOE science laboratories, and will renew their understanding of scientific investigation.

Argonne National Laboratory

Argonne National Laboratory in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. High Energy Physics supports a program of physics research and technology R&D at ANL, using unique capabilities of the laboratory in the areas of accelerator R&D techniques and participation in the CDF and MINOS detector collaborations.

Brookhaven National Laboratory

Brookhaven National Laboratory is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. High Energy Physics supports a program of physics research and technology R&D at BNL, using unique capabilities of the laboratory, including the Accelerator Test Facility and the capability for precision experimental measurement. High Energy Physics also makes limited use of the Alternating Gradient Synchrotron which is principally supported by the Nuclear Physics program.

Fermi National Accelerator Laboratory

Fermi National Accelerator Laboratory is a program-dedicated laboratory (High Energy Physics) located on a 6,800 acre site in Batavia, Illinois. Fermilab operates the Tevatron accelerator and colliding beam facility which consists of a four mile ring of superconducting magnets and is capable of accelerating protons and antiprotons to one TeV. Thus the Tevatron is the highest energy particle accelerator in the world, and has a unique capability for research at the energy frontier. Fermilab, together with SLAC, constitute the principal experimental facilities of the DOE High Energy Physics program.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory is a Multiprogram Laboratory located in Berkeley, California. The Lab is on a 200 acre site adjacent to the Berkeley campus of the University of California. High Energy Physics supports a program of physics research and technology R&D at LBNL, using unique capabilities of the laboratory primarily in the areas of participation in the BaBar collaboration, expertise in superconducting magnet R&D, and expertise in design of forefront electronic devices.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory is a Multiprogram Laboratory located on a 821 acre site in Livermore, California. High Energy Physics supports a program of physics research and technology R&D at LLNL, using unique capabilities of the laboratory primarily in the area of advanced accelerator R&D and participation in the B-factory project.

Los Alamos National Laboratory

Los Alamos National Laboratory is a Multiprogram Laboratory located on a 27,000 acre site in Los Alamos, New Mexico. High Energy Physics supports a program of physics research and technology R&D at LANL, using unique capabilities of the laboratory primarily in the area of theoretical studies, and computational techniques for accelerator design.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education is located on a 150 acre site in Oak Ridge, Tennessee. The High Energy Physics program supports a small effort at ORISE in the area of program planning and review.

Oak Ridge National Laboratory

Oak Ridge National Laboratory is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. The High Energy Physics program supports a small research effort using unique capabilities of ORNL primarily in the area of particle beam shielding calculations.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. The High Energy Physics program supports a small research effort using unique capabilities of PNNL in the area of low background experiments.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory is a program-dedicated laboratory (Fusion Energy Sciences) located on 72 acres in Princeton, New Jersey. The High Energy Physics program supports a small research effort using unique capabilities of PPPL in the area of advanced accelerator R&D.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. SLAC operates for High Energy Physics the newly completed B-factory, the SLAC Linear Collider with the Stanford Large Detector, and a program of fixed target experiments. All of these facilities make use of the two mile long linear collider, or linac. SLAC, together with Fermilab, constitute the principal experimental facilities of the DOE High Energy Physics program.

All Other Sites

The High Energy Physics program funds research at 106 colleges/universities located in 38 states. This line also includes funding of research awaiting distribution pending completion of peer review results or program office detailed planning.

Research and Technology

Mission Supporting Goals and Objectives

The High Energy Physics program has two major subprograms. The Research and Technology subprogram provides support for the scientists who perform the research which is the core of the program, and the technology R&D, which is essential to maintain the accelerator and detector facilities at the cutting edge required for a successful research program. The Facility Operations subprogram, described later, provides the large facilities — accelerators, detectors, colliding beams devices — needed for the research program.

The Physics Research category in the Research and Technology subprogram provides support for university and laboratory based research groups conducting experimental and theoretical research in high energy physics. This research probes the nature of matter and energy at the most fundamental level, and the characteristics of the basic forces in nature. Experimental research activities include: planning, design, fabrication and installation of experiments; conduct of experiments; analysis and interpretation of data; and publication of results. Theoretical physics research provides the framework for interpreting and understanding observed phenomena and, through predictions and extrapolations based on current understanding, identifies key questions for future experimental explorations. This subprogram supports research groups at more than 100 major universities and at 9 DOE laboratories.

The High Energy Technology category in the Research and Technology subprogram provides the specialized advanced technology R&D required to sustain and extend the technology base and provide operational support for the highly specialized accelerators, colliding beams facilities, and detector facilities which are essential to the overall high energy physics program goal of carrying out forefront research. The objectives of this category include: 1) carry out R&D in support of existing accelerator and detector facilities aimed at maintaining and improving their performance parameters and cost effectiveness; 2) carry out R&D in support of planned and proposed projects to maximize their performance goals and cost effectiveness; 3) carry out R&D to transfer new concepts and technologies into practical application in the High Energy Physics context; and 4) carry out R&D to search for and develop new concepts and ideas which could lead to significant enhancements of research capabilities or to significant cost savings in the construction and operation of new facilities. This category supports work primarily at the DOE labs, but also at universities, other federal labs, and in industry.

The High Energy Physics program will provide opportunities for pre-college teachers that will participate directly in cutting-edge research at DOE science laboratories, and will renew their understanding of scientific investigation. Where teachers do not possess sufficient background to participate directly in research, DOE will provide mediated research experiences where teachers can work with teams of scientists and science educators to understand the nature of DOE's scientific research. The goal is to provide educators with the tools to sharpen their science and math foundations and apply these tools to their classroom practice. Funds will be provided to pay for teachers' stipends, travel, housing and subsidize laboratory scientists' time for this activity ($2,921,000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Physics Research	143,592	145,835	159,650	+13,815	+9.5%
High Energy Technology	65,536	69,056	67,540	-1,516	-2.2%
Total, Research and Technology	209,128	214,891	227,190	+12,299	+5.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Physics Research			
■ **Fermilab:** In FY 2000 the experimental physics research groups at Fermilab will be working on completing and bringing into operation the upgraded CDF and D-Zero facilities, completing a fixed target run, analyzing data from recent experimental data taking runs, and preparing for future experiments including participation in the CMS detector for LHC. The theoretical research group and the theoretical astrophysics group will be working on a variety of theoretical topics.	10,415	8,826	9,240
■ **SLAC:** The experimental physics research groups at SLAC will concentrate their efforts in FY 2000 on the physics analysis and interpretation of the large amounts of data taken with the SLC Large Detector (SLD) detector in prior years, and on early data-taking with the recently commissioned BaBar detector facility and B-factory. Some physics research will also be done in a fixed target experiment studying parity violation, and with the CLEO detector at the Cornell Electron Storage Ring (CESR) facility at Cornell. The theoretical physics group will continue to emphasize topics related to the SLD, BaBar, and Next Linear Collider (NLC) research programs as well as tests of the Standard Model and Quantum ChromoDynamics (QCD).	11,411	12,027	12,441
■ **BNL:** In FY 2000, the BNL experimental physics research groups will be working on experiments at the BNL-AGS involving precision measurements of the muon magnet moment, and rare decays of the K meson; on the Fermilab collider experiment D-Zero probing the high energy frontier; and on the U.S. effort on the Large Hadron Collider ATLAS detector. The Theoretical physics research groups will be working on a number of topics.	7,662	7,690	8,226

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **LBNL:** In FY 2000, LBNL researchers will be analyzing data recently taken at the collider detectors and at fixed target experiments at Fermilab, and will be preparing for studies of B-Bbar decays using the BaBar detector on the B-factory at SLAC. The researchers will also be working on supernova measurements to establish values for cosmological parameters. Recent results indicate the universe may be expanding at an increasing rate. The Particle Data Group at LBNL continues as an international clearinghouse for particle physics information.	10,375	10,498	11,033
■ **ANL:** The experimental high energy physics group will continue collaborating in research on the CDF at Fermilab, and ZEUS at the DESY/HERA facility in Hamburg, Germany. They also will be working on the fabrication of two major new detector facilities: the ATLAS detector for future use at CERN's LHC facility, and the MINOS detector at the Soudan site in Minnesota. The MINOS detector is part of the NuMI project and will use a neutrino beam from Fermilab. The theoretical physics group will continue their research in formal theory, collider phenomenology, and lattice gauge calculations.	5,489	5,465	5,465
■ **Universities and Other Laboratories:** The University Program consists of groups at 100 universities doing experiments (77 universities) and theory (75 universities). These university groups plan, build, execute, analyze and publish results of experiments, train graduate students and post-docs; and provide theoretical concepts, simulations and calculations of physical processes involved in high energy physics. Provides support for research scientists at LANL, LLNL, ORNL, and PNNL. This University and small laboratory (LANL, LLNL, ORNL, PNNL) based research activity is described in more detail below. The recent HEPAP Subpanel (Gilman), recommended that the level of funding for the university based portion of the program be substantially increased over inflation over the next two year period. The funding detailed below includes funding for 3.5 percent over inflation providing more than half of the recommended first year increase. These increases are aimed at improving the research capabilities and operational effectiveness of these (primarily) university based research groups.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ **University and other laboratory based Research using Fermilab:** Some 55 DOE-funded universities participate in large international collaborations doing experiments at Fermilab. LLNL is also involved in the MINOS project. These experiments involve the CDF and D-Zero collider detectors, and the KTEV, FOCUS, MINOS, DONUT, and HYPER-CP experiments using external beams of kaons, photons, neutrinos and hyperons. Other experiments are performed in the antiproton accumulator. These universities help to fabricate the detectors, plan and execute the experiments, analyze data and publish the results. The participation has been and is expected to remain about constant, as fixed target 800 GeV experiments diminish and CMS, MINOS, and BTeV related activities increase.	24,905	25,170	26,940
▸ **University and other laboratory based Research using SLAC:** Some 27 DOE–funded universities participate in large international collaborations doing experiments at SLAC. LLNL is also involved in the BaBar detector project. The experiments involve the SLD and BaBar detectors, and other smaller detectors for fixed target experiments. These universities help to build the detectors, plan and carry out experiments, analyze the data and publish the results. The participation has been and is expected to remain about constant, as SLD diminishes, BaBar flourishes, and work on a future large linear collider continues.	9,960	10,360	11,400
▸ **University based Research using BNL:** Some 10 DOE-funded universities participate in collaborative experiments at BNL. These experiments involve fixed targets and kaon or pion beams, colliding beams of protons (RHIC-SPIN) or nuclei (PHOBOS) at RHIC, and external storage rings measuring the muon anomalous magnetic moment to high precision. This participation has decreased significantly due to the phasing out of most of the AGS High Energy Physics program.	3,980	2,960	2,070

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ **University based Research using the Cornell Electron Storage Rings:** Some 11 university High Energy Physics groups with DOE funding participate in the electron-positron colliding beam experiments at Cornell's CESR facility utilizing the collaboratively built CLEO detector. They help to plan, build, execute, analyze and publish the experiments. This participation has been decreasing, as some groups move to BaBar at SLAC.	4,980	4,440	4,145
▸ **University and other laboratory based Research not using accelerators:** Some 28 DOE-funded universities are involved in High Energy Physics experiments not utilizing accelerators. LANL, LLNL and PNNL are also involved in non-accelerator experiments. These experiments, which are primarily in the areas of astrophysics and cosmology, include MACRO (Italy), Super-Kamiokande (Japan), SNO (Canada), CHOOZ (France), SOUDAN (Minnesota), CDMS (Stanford), GRANITE (Mt. Hopkins, Arizona), Palo Verde (Arizona) and AMS (Space Station). They help build the detectors, plan, execute, analyze and publish the results. This participation has increased and is expected to increase further due to the newly emerging interest and opportunities in astrophysics and cosmology, such as GLAST, AUGER and CDMS (Soudan). The funding includes an increase of $1,800,000 for the fabrication of underground detectors such as those listed above. The allocation of these funds will be decided on the basis of a peer review process which is presently underway.	12,950	15,300	18,115
▸ **University and other laboratory Theoretical Studies:** Some 75 universities with DOE funding participate in research in theoretical high energy physics. Theoretical studies at LANL are also included here. This effort is expected to remain about constant. They provide theoretical ideas, concepts, calculations and simulations of physical processes in high energy physics.	18,920	19,250	20,720

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ **University based Research using Foreign Labs:** Universities funded by the DOE are doing experiments with international collaborations using facilities at foreign accelerator labs. Some 45 universities are conducting experiments at CERN (Switzerland), 11 at DESY (Germany), 10 at KEK (Japan), 1 at IHEP (Russia), 1 at BINP (Russia), and 2 at Beijing (China). They help to fabricate the detectors and experimental apparatus, plan and execute the experiments, analyze the data and publish the results. The participation has increased and is expected to increase further with the participation in the ATLAS and CMS detectors at CERN's LHC. The funding includes an increase of $1,000,000 to address technical infrastructure needs, such as technical staff and computers, related to research operations at foreign laboratories.	20,925	22,700	26,930
▸ **Other University and other laboratory based Research activities:** A new focussed program in Detector R&D, recommended by the HEPAP Subpanel, was started modestly in FY 1999, will be continued and expanded slightly ($1,000,000). The Outstanding Junior Investigator program, which is intended to identify and provide support for highly promising investigators at an early stage in their careers, will continue at a level of about $400,000 in new awards per year. A new educational program, Quark-Net, aimed at involving high school students and teachers in high energy physics research, will be started in FY 1999 and will continue at $250,000. The accelerator and beamline shielding studies carried out at ORNL are included here. Funding of conferences, studies, and workshops is also included here. The funding includes an increase of $500,000 to increase the capability of the computer network link to CERN and an increase of $750,000 for anticipated but unknown needs or opportunities which is not yet allocated.	1,620	1,149	2,925
Total, Universities and Other Laboratories	98,240	101,329	113,245
Total, Physics Research	143,592	145,835	159,650

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
High Energy Technology			
■ **Fermilab:**			
▸ **Accelerator R&D:** Activities in FY 2000 include design of an improved proton source; design of an electron cooling system to improve antiproton beam quality: construction of a large-scale experiment to test the concept of ionization cooling, which is critical for any future muon collider; R&D on superconducting magnets and other components for future 100 TeV proton colliders; and tests of accelerating electrons with plasma wake-fields driven by intense electron beams. Muon collider R&D, with a high priority in the National High Energy Physics program, will increase in FY 2000. The proposed funding provides an approximately constant level of effort, except for the increase to permit the critical muon collider experiment to proceed.	9,221	7,670	8,670
▸ **Experimental Facilities R&D:** Activities in FY 2000 include: R&D on the feasibility of reducing the cell size in the CDF detector wire chamber to accommodate the higher track density that will result from increasing the Tevatron collider event rate; developing scintillating fibers for the D–Zero detector that are capable of withstanding the increased radiation level resulting from the increased collision rates; R&D on radiation-hard materials such as diamond and silicon carbide to replace silicon micro strip detectors at high collision rates; R&D on specialized electronics for high event rates in numerous, high-density data channels; and developing parallel computing configurations, high speed networks, and high-capacity data storage systems for high data rates. The proposed funding provides a slightly decreasing level of effort.	8,700	6,670	6,670
Total, Fermilab	17,921	14,340	15,340

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **SLAC:**			
▸ **Accelerator R&D:** Activities in FY 2000 include R&D to explore new concepts in accelerator physics in support of design of future linear colliders. The R&D on the design for a linear collider to operate with TeV scale center of mass energy will be reduced to $12,000,000 in FY 2000. Relevant areas are high powered radio frequency systems, accelerator structures, controls and instrumentation, and advanced beam optics. This R&D and design activity is being done in the context of an international collaboration. R&D in support of the B-factory, commissioned in FY 1999, will continue at a significant level to ensure a strong luminosity performance in the initial data run for physics research. The R&D programs in generic collider R&D will continue, and the program in advanced accelerator physics looking at the use of lasers, plasmas, and ultra high frequency radio frequency systems, will be given slightly increased priority.	14,651	16,500	11,900
▸ **Experimental Facilities R&D:** In FY 2000, the focus will be on instrumentation for physics studies in the center of mass collision energy range of 50 GeV to 5,000 GeV. This will include work to support and improve performance of BaBar, the newly operating B-factory detector, and an expanded program of R&D, consistent with the recommendations of the HEPAP Subpanel, on developing preliminary designs for a detector to operate with a new electron-positron linear collider operating at the TeV center of mass energy scale.	1,545	2,500	2,900
Total, SLAC	16,196	19,000	14,800

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **BNL:**			
▸ **Accelerator R&D:** Activities in FY 2000 will include, R&D on new methods of particle acceleration such as laser acceleration and Free Electron Laser (FEL) accelerators, primarily using the excellent capabilities of the BNL Accelerator Test Facility. R&D on the muon collider concept will be expanded and will include design work on key system components including the high field solenoid and the dipole magnets. In the BNL superconductor test facility the characterization of new high critical temperature superconductors as well as their special requirements for magnet fabrication should be better understood. With the transfer of the AGS to the Nuclear Physics program during FY 1999, Accelerator R&D in support of the AGS is being brought to an orderly close.	5,570	5,045	5,155
▸ **Experimental Facilities R&D:** In FY 2000, semiconductor drift photo diodes for detection of photons of energies as low as 50 eV will be designed and produced. Development of radiation hardened monolithic electronics for a number of experiments will continue. Development of lead-wolfrate crystals with improved light output will continue. Testing of the modules that constitute the ATLAS barrel calorimeters will begin.	3,065	1,075	1,075
Total, BNL	8,635	6,120	6,230
■ **LBNL:**			
▸ **Accelerator R&D:** LBNL is a major contributor to accelerator and superconducting magnet R&D for advanced accelerator concepts, including the muon collider and the next linear collider. Development of these concepts is needed to advance the energy and luminosity frontiers to better understand the structure of matter. LBNL has a major role in designing, building, and testing the Low Energy Ring at the B-factory. In FY 1999, the B-factory will be fully commissioned. In FY 2000, preparations for muon cooling experiments, needed to confirm the practicality of a muon collider, will begin at Fermilab, using components developed at LBNL. The high-gradient, all-optical, laser-plasma wakefield accelerator at LBNL will begin accelerating electron bunches.	6,935	6,905	7,565

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ **Experimental Facilities R&D:** LBNL leads in providing custom state-of-the-art electronics, such as silicon vertex detectors, integrated circuit (IC) systems, and other components for high-energy particle detectors such as BaBar at the B-factory and the upgrades to CDF and D–Zero for the next, higher luminosity, runs at Fermilab. LBNL is also involved in developing computer programs for experimental data taking and analysis. In FY 2000, work will continue on large format CCDs and high-resolution imaging systems, plus the production and testing of IC systems.	2,620	2,670	2,670
Total, LBNL	9,555	9,575	10,235

■ ANL:

▸ **ANL Accelerator R&D:** R&D will continue on the acceleration of electrons using structures with plasmas or structures made of dielectric materials called wakefield accelerators. Using this new technique, accelerating gradients at one-third of conventional levels have been reached. Thus there is optimism that the much higher gradient predicted by theory can be achieved. Planning will be underway for an upgraded experimental facility which could generate much higher gradients. In addition, work will be undertaken on muon collider R&D as recommended by the HEPAP Subpanel.	1,135	1,130	1,305
▸ **Experimental Facilities R&D:** In FY 2000 work will be underway on the MINOS detector, the ATLAS detector for the LHC, and a possible upgrade of the ZEUS detector at DESY.	900	920	920
Total, ANL	2,035	2,050	2,225

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Universities, Other Laboratories, and Other Contractors:**			
▸ **University Program:** The funding will provide for a program of high priority technology R&D relevant to the development of particle accelerators. The R&D is aimed at breakthrough technologies; superconductors for high-field magnets; laser and collective-effect accelerator techniques; novel, high-power radio frequency generators; theoretical studies in particle beam physics, including the non-linear dynamics of particle beams; and at lowering the cost and improving the performance of future experiments and facilities. This element also includes the portion of the increased funding for R&D on future facility concepts as summarized in the table below which has not yet been allocated. Discussions and peer reviews are underway to design an optimum overall program and to identify and fund key activities. In FY 1998 $770,000 was transferred to the STTR program. Additional funding for the SBIR program is contained in the Facility Operations subprogram.	11,194	17,971	18,710
Total, High Energy Technology	65,536	69,056	67,540
Total, Research and Technology, ...	209,128	214,891	227,190

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ **Physics Research**	
▸ An increase in the base funding for the university program as recommended by the HEPAP.	+6,475
▸ An increase in the funding for the fabrication of non accelerator experiments as recommended by the HEPAP.	+1,800
▸ An increase to initiate an expanded program of detector R&D as recommended by the HEPAP.	+600
▸ An increase to provide for additional R&D to address the computing and networking needs of the new generation of detectors.	+1,500
▸ Initiation of an education program at National Laboratories.	+2,921

	FY 2000 vs. FY 1999 ($000)
▸ An increase in the funds held for allocation pending completion of planning and peer review activities.	+519
Total, Physics Research	+13,815
■ **High Energy Technology**	
▸ An increase in the funding for muon collider R&D at Fermilab	+1,000
▸ A decrease in the funding for NLC R&D at SLAC.	-5,000
▸ An increase in other Technology R&D at SLAC.	+800
▸ An increase in the funding for muon collider R&D at BNL.	+980
▸ Termination of the program of accelerator R&D at the AGS.	-870
▸ An increase in the funding of muon collider R&D at LBNL.	+660
▸ An increase in the funding for muon collider R&D at ANL.	+175
▸ An increase in the base funding for the advanced accelerator R&D program.	+620
▸ An increase in the funding held for allocation pending completion of planning and peer review activities.	+119
Total, High Energy Technology	-1,516
Total Funding Change, Research and Technology	+12,299

The following table summarizes the above changes for possible future HEP facilities:

	(dollars in millions)		
	FY 1998	FY 1999	FY 2000
Next Linear Collider	10.0	17.0	12.0
Muon-Muon Collider	4.5	5.5	8.2
Very Large Hadron Collider	2.5	3.0	3.0

Facility Operations

Mission Supporting Goals and Objectives

The Facility Operations subprogram includes the provision and operation of the large accelerator and detector facilities which are the essential tools that enable scientists in university and laboratory based research groups to perform experimental research in high energy physics. This subprogram includes funding for the operation and maintenance of the national laboratory research facilities including accelerators, colliders, secondary beam lines, detector facilities for experiments, experimental areas, computing, and computing networking facilities. It includes the costs of detector and accelerator components, personnel, electric power, expendable supplies, replacement parts and subsystems, inventories and, at Fermilab and SLAC, waste management activities. General Plant Projects (GPP) funding is provided for minor new construction, other capital alterations and additions, and for buildings and utility systems. Landlord General Purpose Equipment (GPE), and GPP funding for Lawrence Berkeley National Laboratory, Fermi National Accelerator Laboratory and Stanford Linear Accelerator Center are also included. Accelerator Improvement Projects (AIP) funding support for additions and modifications to accelerator facilities which are supported by the High Energy Physics research program is also included.

The principal objective of the Facility Operations subprogram is to maximize the quantity and quality of data collected for approved experiments being conducted at the High Energy Physics facilities. The ultimate measure for success in the Facility Operations subprogram is whether the research scientists have data of sufficient quantity and quality to do their planned measurements or to discover new phenomena. The quality of the data is dependent on the accelerator and detector capabilities, and on the degree to which those capabilities are achieved during a particular operating period. The quantity of the data relates primarily to the beam intensity, the length of the operating periods, and the operational availability of the accelerator and detector facilities.

Performance Measures

- Progress on achieving luminosity and operational efficiency for the B-factory at SLAC as measured by comparison with stated project goals.
- Progress on achieving luminosity and operational efficiency for the Tevatron at Fermilab in its new mode of operation with the recently completed Main Injector.
- High Energy Physics will begin operating the B-factory at SLAC, the Main Injector for the Tevatron at Fermilab.

Planned Accelerator Operations

	(in weeks)		
	FY 1998	FY 1999	FY 2000
Fermilab	13	38	29
SLAC	33	42	39
BNL	12	14	8

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Fermi National Accelerator Laboratory	191,195	210,145	212,743	+2,598	+1.2%
Stanford Linear Accelerator Center	107,745	111,290	118,290	+7,000	+6.3%
Brookhaven National Laboratory	59,367	42,882	5,347	-37,535	-87.5%
Universities and Other Laboratories	10,345	25,408	29,910	+4,502	+17.7%
Large Hadron Collider	35,000	65,000	70,000	+5,000	+7.7%
Waste Management	4,960	4,910	4,910	0	0.0%
Total, Facility Operations	408,612	459,635	441,200	-18,435	-4.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Fermilab			
Provides support for operation, maintenance, improvement, and enhancement of the Tevatron accelerator and detector complex. This complex includes the Tevatron, which can operate in a collider mode with protons and anti-protons, or in a fixed target mode with protons only; the new Main Injector which will be completed and commissioned in FY 1999; the Booster; the Linac; and the Anti-proton Source and Accumulator. The Tevatron collider and the 800 GeV fixed target modes are mutually exclusive; however, a fixed target program at 120 GeV using the new Main Injector is possible in parallel with Tevatron collider operation. This complex also includes the two large colliding beams detectors – CDF and D-Zero – and a number of fixed target experiments in the external beams areas.			
■ **Accelerator Operation:** In FY 2000, the upgraded Tevatron complex will be operated for about 6 weeks ending a fixed target run begun in FY 1999. This will be followed by 8 weeks of commissioning of the Main Injector and 15 weeks of operation of the Tevatron in collider mode with the higher luminosity available from the newly completed Main Injector. The funds requested will provide for the operation of the Tevatron, the Main Injector, the Booster, the Linac and the antiproton source as needed. The reduction in capital expenditures resulting from the completion of the CDF and D-Zero detector upgrade projects is partially offset by the planned increase for the MINOS Detector.	116,910	126,535	126,333

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Experimental Facility Operations:** In FY 2000, the upgrades of the CDF and the D-Zero detectors will be completed and the upgraded detectors will be brought into operation. In addition, the funding will support the active experiments in the completion of the fixed target run. The funding will also be used to provide the computing resources needed for the analysis of existing data and the planning and design of future experiments.	74,285	83,610	86,410
Total, Fermilab	191,195	210,145	212,743

Tevatron Operation

	(in weeks)		
	FY 1998	FY 1999	FY 2000
Fixed Target	0 [a]	22	6
Collider	0 [a]	0	15
Commissioning	13	16	8
Total, Tevatron Operation	13	38	29

SLAC

Provides for the operation, maintenance, improvement and enhancement of the accelerator and detector complex on the SLAC site. The accelerators include the electron linac and the SLC, and to these is being added the B-factory completed in FY 1999. The detector facilities include the SLD, the End Station A experimental set-ups, and BaBar, the detector which is being constructed for use with the B-factory. Also provides for maintenance of the laboratory physical plant.

[a] Operation of the Tevatron in collider or fixed target mode in FY 1998 is precluded by the long shutdown needed for completion of the Fermilab Main Injector project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Accelerator Operation:** Accelerator operations at SLAC in FY 2000 will concentrate heavily on about 9 months of strong utilization of the newly completed asymmetric B-factory colliding beam storage rings in order to maximize the data collected by the BaBar detector facility. The linac will serve primarily as the injector of positrons and electrons to the B-factory storage rings during this time, although a 5 month parasitic run of a fixed target experiment at the full linac energy is also planned. Includes initial Major Item of Equipment (MIE) funding ($3,000,000) for the fabrication of a portion of the Gamma-ray Large Area Space Telescope (GLAST) project. GLAST, a high sensitivity space based instrument for the study of high energy gamma rays, is planned as a joint DOE-NASA project and has the potential for significant contributions from a number of foreign collaborators. SLAC is the lead laboratory for the DOE portion of the project. Total estimated cost is subject to further negotiations with NASA and potential foreign collaborators.	82,228	79,300	84,500
■ **Experimental Facility Operations:** Experimental facility operations will emphasize running the newly completed BaBar detector facility, which will be the priority research program at SLAC in FY 2000. The End Station A complex will also be operated during the fixed target run.	25,517	31,990	33,790
Total, SLAC	107,745	111,290	118,290

SLAC Operation

	(in weeks)		
	FY 1998	FY 1999	FY 2000
SLC	16	0	0
Fixed Target	0	10	15[a]
B-factory Commissioning	17	16	0
B-factory Operation	0	16	39
Total, SLAC Operation	33	42	39

[a] Fixed Target operation in parallel with B-factory operation.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
BNL			
Provides support for the operation, maintenance, improvement, and enhancement of the accelerator and detector complex on the BNL site. The principal facility is the AGS and its complement of experimental set ups. The AGS was transferred to the Nuclear Physics program during the 3rd quarter of FY 1999 to be operated as part of the RHIC facility. In FY 2000, the AGS operation for the HEP program will be on an incremental cost basis.			
■ **Accelerator Operation:** Operation activities covered under this budget category include the incremental cost of running the AGS complex for HEP. Operation for High Energy Physics in FY 2000 will be a eight week run for the muon magnetic moment experiment. Includes, in FY 1998 and FY 1999, but not FY 2000 landlord GPP and GPE funding..	38,332	29,672	3,047
■ **Experimental Facility Operations:** Provides for eight weeks of operation of the muon magnetic moment experiment and general support activities in the experimental areas.	21,035	13,210	2,300
Total, BNL	59,367	42,882	5,347

AGS Operation

(in weeks)

	FY 1998	FY 1999	FY 2000
AGS Operation for HEP	12	14	8

Universities and Other Labs			
Provides for capital equipment funding at ANL, LBNL, some smaller DOE labs, and for university based researchers. Provides landlord GPP and GPE for LBNL beginning in FY 2000. Includes $14,735,000 in FY 1999 and $15,015,000 in FY 2000 for the SBIR and STTR programs. Provides for certain computer networking expenses.	10,345	25,408	29,910
Large Hadron Collider			
■ In FY 1998 and FY 1999, funding was used for: R&D and measurement/testing on superconducting materials, cable, and wire; calculations and R&D on accelerator physics issues regarding the design, instrumentation, and prototypes of the magnets and RF accelerating cavities for the colliding beam intersection regions. Activities on the detectors will include R&D and prototype development of subsystems such as			

(dollars in thousands)

FY 1998	FY 1999	FY 2000

tracking chambers, calorimeters, and data acquisition electronics. The LHC work is being performed at various locations including 4 major DOE labs and more than 55 U.S. universities.

LHC Accelerator and Detector Funding Summary

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Facility Operations			
LHC			
Accelerator Systems			
Operating Expenses	4,315	7,070	600
Capital Equipment	9,685	8,330	19,500
Total, Accelerator Systems	14,000	15,400	20,100
Procurement from Industry	0	14,340	11,100
ATLAS Detector			
Operating Expenses	4,416	8,440	4,900
Capital Equipment	5,634	2,760	10,600
Total, ATLAS Detector	10,050	11,200	15,500
CMS Detector			
Operating Expenses	5,650	14,550	14,110
Capital Equipment	5,300	9,510	9,190
Total, CMS Detector	10,950	24,060	23,300
Total, LHC	35,000	65,000	70,000

- **Accelerator Systems:** In FY 2000, funding will support continuation of the production of interaction region quadrupole magnets, feedboxes, and absorbers; production of RF region dipoles; superconducting cable testing and support; and accelerator physics design studies. 14,000 15,400 20,100
- **Procurement from Industry:** Funding will support reimbursement to CERN for purchases from U.S. industry including superconducting wire, cable, and cable insulation materials. 0 14,340 11,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ **ATLAS Detector:** In FY 2000, funding will support the production of silicon strips, transition radiation tracker (TRT) modules, barrel cryostat and feedthroughs, front end electronics for the liquid argon calorimeter, the extended barrel tile calorimeter and electronics, the monitored drift tube muon chambers and electronics, and the alignment system for the muon spectrometer. The funding will also provide for advanced prototypes: the readout drivers (RODs) for the silicon and liquid argon systems, the TRT electronics, the electronic system for the liquid argon calorimeter. The R&D will be concluding for the pixel detectors while continuing for the trigger and data acquisition system.	10,050	11,200	15,500
▸ **CMS Detector:** In FY 2000, funding will support work on three of the subsystems in CMS. The endcap muon system will have set up the cathode strip chamber factory in FY 1999, and will be in full production. The hadron calorimeter system will have completed the two preproduction prototypes in FY 1999 and be in full production of copper absorber and the optics. The magnet system will complete the procurement of the majority of the items for the barrel and endcap steel flux return and the coil vacuum tank. The electromagnetic calorimeter subsystem will include procurement of front end transducers and electronics. The trigger/data acquisition and forward pixel subsystems will still be in an engineering phase.	10,950	24,060	23,300
Total, LHC	35,000	65,000	70,000
Waste Management			
■ Continues the pilot program concerning packaging, shipment and disposition of hazardous, radioactive or mixed waste generated in the course of normal operations at Fermilab and SLAC. This pilot program is intended to evaluate opportunities to reduce the volume of newly generated waste and its associated management and disposal costs..	4,960	4,910	4,910
Total, Facility Operations	408,612	459,635	441,200

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ **Fermilab**	
▸ An increase to support full operation of the facility.	+5,600
▸ An increase in GPP.	+999
▸ A decrease in equipment funding reflecting the completion of the CDF and D-Zero detectors offset by increase in the funding for the NuMI/Minos detector.	-4,001
Total, Fermilab	+2,598
■ **Stanford Linear Accelerator Center**	
▸ An increase to support full utilization of the B-factory.	+5,300
▸ An increase in AIP and GPP.	+1,700
Total, Stanford Linear Accelerator Center	+7,000
■ **Brookhaven National Laboratory**	
▸ A decrease reflecting the transfer of the AGS to the NP program.	-28,175
▸ A decrease reflecting the transfer of landlord responsibilities (GPP, GPE) to NP.	-9,360
Total, Brookhaven National Laboratory	-37,535
■ **Universities/Other**	
▸ An increase reflecting primarily the addition of the landlord responsibilities (GPP, GPE) at LBNL to HEP.	+4,502
■ **Large Hadron Collider**	
▸ An increase to follow the agreed profile.	+5,000
Total Funding Change, Facility Operations	-18,435

Construction

Mission Supporting Goals and Objectives

This provides for the construction of major new facilities needed to meet the overall objectives of the High Energy Physics Program.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Construction	50,850	21,000	28,700	+7,700	+36.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Fermilab Main Injector Project:** This project provides for a new accelerator to replace the injector accelerator for the Tevatron complex. The present injector for the Tevatron is the original Fermilab main ring which is less than fully adequate and nearing the end of its useful lifetime. The accelerator will be commissioned and the project completed during FY 1999.	30,950	0	0
■ **SLAC Master Substation Upgrade:** This project provides for an upgrade and reconfiguration of the main electric power substation on the SLAC site. Obsolete (and hazardous) switch gear will be replaced and load balancing will be implemented thus extending the useful life of the existing main 230 kv transformers. Procurement of long lead switch gear items was initiated in FY 1997, and the project will be completed by the end of FY 1998.	9,400	0	0
■ **Neutrinos at the Main Injector (NuMI):** This project provides for the construction of new facilities at Fermilab and at the Soudan Underground Laboratory in Soudan, Minnesota which are especially designed for the study of the properties of the neutrino and in particular to search for the neutrino oscillations. The FY 2000 funding is for continued detailed design and initiation of construction of conventional facilities and technical components.	5,500	14,300	22,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **C-Zero Area Experimental Hall:** This project provides for the construction of a new experimental hall at the C-Zero location on the Fermilab Tevatron ring. This will be used to house modest sized collider and fixed target experiments in a new experimental program being planned at Fermilab. This project will be completed in FY 1999.	5,000	0	0
■ **Wilson Hall Safety Improvement Project (Fermilab):** This project provides for urgently needed rehabilitation of the main structural elements of Wilson Hall, and for urgently needed rehabilitation of windows, plumbing, the roof and the exterior of the building.	0	6,700	4,700
■ **SLAC Research Office Building:** This project provides urgently needed office space for the substantial expansion of visiting scientists, or "users", which will occur when the B-factory becomes operational. The visiting user population is projected to increase from 200 visitors per year to 1,100 visitors per year. The new building will provide about 30,000 square feet and will be completed in FY 2001.	0	0	2,000
Total, Construction	50,850	21,000	28,700

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ Continuation of the Wilson Hall Safety Improvement Project at Fermilab.	-2,000
■ Continuation of the Fermilab NuMI project.	+7,700
■ Initiation of the Research Office Building.	+2,000
Total Funding Change, Construction	+7,700

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000 Request	$ Change	% Change
General Plant Projects	13,455	14,841	12,985	-1,856	-12.5%
Accelerator Improvement Projects	5,963	10,186	10,885	+699	+6.9%
Capital Equipment	93,539	76,363	90,315	+13,952	+18.3%
Total, Capital Operating Expense	112,957	101,390	114,185	+12,795	+12.6%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000 Request	Unappropriated Balance
92-G-302 Fermilab Main Injector	229,600	198,650	30,950	0	0	0
97-G-303 SLAC Master Substation Upgrade	12,400	3,000	9,400	0	0	0
98-G-304 Neutrinos at the Main Injector	76,200	0	5,500	14,300	22,000	34,400
98-G-305 C-Zero Area Experimental Hall	5,000	0	5,000	0	0	0
99-G-306 Wilson Hall Safety Improvements	15,600	0	0	6,700	4,700	4,200
00-G-307 SLAC Office Building	7,200	0	0	0	2,000	5,200
Total Construction		201,650	50,850	21,000	28,700	43,800

Major Items of Equipment *(TEC $2 million or greater)*

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000 Request	Acceptance Date
D-Zero Upgrade	55,270	28,467	14,525	9,555	2,723	FY 2000
CDF Upgrade	54,957	27,957	13,525	9,555	3,920	FY 2000
B-factory detector (BaBar)[a]	68,000	43,000	21,700	3,300	0	FY 1999
Antimatter in Space	3,192	2,992	200	0	0	FY 1998
Super-Kamiokande	3,584	3,053	531	0	0	FY 1998
Large Hadron Collider — Machine [a]	90,615	0	11,485	8,330	19,500	FY 2005
Large Hadron Collider — ATLAS Detector [a]	63,424	0	5,634	2,760	10,600	FY 2005
Large Hadron Collider — CMS Detector [a]	55,950	0	5,300	9,510	9,190	FY 2005
MINOS	45,000	0	0	2,000	5,868	FY 2002
GLAST[b]	N/A	0	0	0	3,000	N/A
Total, Major Items of Equipment		105,469	72,900	45,010	54,801	

[a] The funding for the B-factory detector reflects cost savings of about $20,000,000 resulting from contributions of components and subsystems by non-U.S. collaborating institutions.

[b] Total estimated cost is subject to further negotiations with NASA and potential foreign collaborators.

98-G-304, Neutrinos at the Main Injector (NuMI), Fermi National Accelerator Laboratory, Batavia, Illinois

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

Total Estimated Cost and Total Project Cost have been adjusted due to changes in the construction profile.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(A-E and technical design only)*	1Q '98	4Q '98	NA	NA	5,500	6,300
FY 1999 Budget Request *(Preliminary Estimate)*	—"—	3Q '99	1Q '99	4Q '02	75,800	135,300
FY 2000 Budget Request	3Q '98	2Q '00	3Q '99	2Q '03	76,200	136,100

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1998	5,500	5,500	1,140
Construction			
1999	14,300	14,300	8,360
2000	22,000	22,000	26,300
2001	23,000	23,000	27,000
2002	11,400	11,400	11,900
2003	0	0	1,500

3. Project Description, Justification and Scope

The project provides for the design, engineering and construction of new experimental facilities at Fermi National Accelerator Laboratory in Batavia, Illinois and at the Soudan Underground Laboratory at Soudan, Minnesota. The project is called NuMI which stands for Neutrinos at the Main Injector. The purpose of the project is to provide facilities which will be used by particle physicists to study the properties of neutrinos, which are fundamental elementary particles. In the Standard Model of elementary

particle physics there are three types of neutrinos which are postulated to be massless and to date, no direct experimental observation of neutrino mass has been made. However, there are compelling hints from experiments which study neutrinos produced in the sun and in the earth's atmosphere that indicate that if neutrinos were capable of changing their type it could provide a credible explanation for observed neutrino deficits in these experiments.

The primary element of the project is a high flux beam of neutrinos in the energy range of 1 to 40 GeV. The technical components required to produce such a beam will be located on the southwest side of the Fermilab site, tangent to the new Main Injector accelerator at the MI-60 extraction region. The beam components will be installed in a tunnel of approximately 1 km in length and 6.5 m diameter. The beam is aimed at two detectors (MINOS) which will be constructed in experimental halls located along the trajectory of the neutrino beam. One such detector will be located on the Fermilab site, while a second will be located in the Soudan Underground Laboratory. Two similar detectors in the same neutrino beam and separated by a large distance are an essential feature of the experimental plan.

The experiments which are being designed to use these facilities will be able to search for neutrino oscillations occurring in an accelerator produced neutrino beam and hence determine if neutrinos do have mass. Fermilab is the only operational high energy physics facility in the U.S. with sufficiently high energy to produce neutrinos which have enough energy to produce tau leptons. This gives Fermilab the unique opportunity to search for neutrino oscillations occurring between the muon and the tau neutrino. Additionally, the NuMI facility is designed to accommodate future enhancements to the physics program that could push the search for neutrino mass well beyond the initial goals established for this project.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs	7,150	7,720
Design Management costs (0.0% of TEC)	10	8
Project Management costs (0.0% of TEC)	20	22
Total, Engineering design inspection and administration of construction costs (9.4% of TEC)	7,180	7,750
Construction Phase		
Buildings	8,320	2,880
Special Equipment	10,120	10,270
Other Structures	30,960	38,690
Construction Management (6.0% of TEC)	4,590	540
Project Management (2.8% of TEC)	2,170	1,620
Total, Construction Costs	56,160	54,000
Contingencies		
Design Phase (2.8% of TEC)	2,172	not available
Construction Phase (14.0% of TEC)	10,688	not available
Total, Contingencies (16.8% of TEC)	12,860	14,050
Total, Line Item Cost (TEC)	76,200	75,800

5. Method of Performance

Design of the facilities will be by the operating contractor and subcontractor as appropriate. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

[a] The annual escalation rates assumed for FY 1996 through FY 2002 are 2.5, 2.8, 3.0, 3.1, 3.3, 3.4, and 3.4 percent respectively.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Total, Line item TEC	0	1,140	8,360	26,300	40,400	76,200
Other Project Costs						
Capital equipment [a]	0	0	2,000	5,868	36,357	44,225
R&D necessary to complete construction [b]	450	810	40	0	0	1,300
Conceptual design cost [c]	630	200	0	0	0	830
Other project-related costs [d]	0	1,520	960	7,632	3,433	13,545
Total, Other Project Costs	1,080	2,530	3,000	13,500	39,790	59,900
Total Project Cost (TPC)	1,080	3,670	11,360	39,800	80,190	136,100

[a] Costs to fabricate the near detector at Fermilab and the far detector at Soudan. Includes systems and structures for both near detector and far detector, active detector elements, electronics, data acquisition, and passive detector material.

[b] This provides for project conceptual design activities, for design and development of new components, and for the fabrication and testing of prototypes. R&D on all elements of the project to optimize performance and minimize costs will continue through early stages of the project. Specifically included are development of active detectors and engineering design of the passive detector material. Both small and large scale prototypes will be fabricated and tested using R&D operating funds.

[c] Includes operating costs for development of conceptual design and scope definition for the NuMI facility. Also includes costs for NEPA documentation, to develop an Environmental Assessment, including field tests and measurements at the proposed construction location.

[d] Include funding required to complete the construction and outfitting of the Soudan Laboratory for the new far detector by the University of Minnesota.

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs [a]	500	NA
Utility costs (estimate based on FY 1997 rate structure) [b]	500	NA
Total related annual funding	1,000	NA
Total operating costs *(operating from FY 2003 through FY 2007)*	5,000	NA

[a] Including personnel and M&S costs (exclusive of utility costs), for operation, maintenance, and repair of the NuMI facility.

[b] Including incremental power costs for delivering 120 GeV protons to the NuMI facility during Tevatron collider operations, and utility costs for operation of the NuMI facilities, which will begin beyond FY 2002.

99-G-306, Wilson Hall Safety Improvements Project, Fermi National Accelerator Laboratory, Batavia, Illinois

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request	1Q '99	2Q '00	3Q '99	3Q '02	15,600	18,800
FY 2000 Budget Request	1Q '99	2Q '00	3Q '99	3Q '02	15,600	18,800

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Construction			
1999	6,700	6,700	1,690
2000	4,700	4,700	6,340
2001	4,200	4,200	6,990
2002	0	0	580

3. Project Description, Justification and Scope

Wilson Hall, constructed in 1972, is the central laboratory facility for the Fermilab site. It is a 17 story reinforced concrete building with a 16 story atrium. The great majority of its area is devoted to office space. In addition, the building contains the cafeteria, the communications center, medical office, some light industrial and shop areas, and an 800 seat auditorium.

The Wilson Hall Safety Improvements Project is a comprehensive project to remediate the deficiencies in this facility. Among the causes for the deficiencies are the age of the building and its systems, safety issues and updating to current code standards, and building components and systems that have reached their useful life expectancy.

The structural deficiencies are currently resulting in the ongoing safety issue of falling concrete debris in occupied areas of the building, and will eventually threaten the integrity of the entire facility. Additional spalling of the concrete could occur on the exterior faces of the building. The current glazing in the sloped window walls is not the code required safety glass. Breakage could result in the falling of sharp edged shards of glass into the atrium area. The quality of the existing drinking water is poor (taste & color) resulting in low usage which allows levels of lead and copper to exceed regulatory requirements.

The building structure portion of this project provides for the rehabilitation of the existing concrete structure at the crossover bays, which connect the two towers that comprise Wilson Hall. The joints between the crossover bays and tower are experiencing significant structural degradation, resulting in the ongoing safety issue of falling debris and the probability of continued deterioration of the joints. Recent computer analysis of the movement of the building structure has indicated that the joints need to be reworked to allow for the seasonal movement caused by temperature changes. This project will implement the solution to the joint erosion problem. It will consist of reconstructing the joints (assuring effective independent movement of each tower). Since a number of areas in the building will have restricted occupancy while the repairs are being made, this project will include the staff relocation required to accommodate the construction as part of Other Project Costs. At the completion of the structural joint repairs, a thorough exterior inspection will be conducted and any necessary repairs completed.

The building envelope portion of this project provides for the weatherproofing of components of the building shell that are currently allowing water penetration, the refurbishment of the existing skylight system, refinishing and partially reglazing the north and south curtain walls, and replacing the exterior entrances, including the entrance plaza:

Entry Plaza: The plaza that covers the "catacomb" area will have clear sealer applied to the sloped portions of the concrete walls enclosing the catacombs. The raised plaza portions will have waterproofing and pavers installed over the existing concrete. The existing paving at the entrance plaza will be removed and a new waterproof membrane and new paving will be installed.

North and South Curtain Wall: The north and south curtain walls of Wilson Hall are comprised of an anodized aluminum framing system that extends the full height of the building. The lower six floors of the system are sloped but do not have the current code required safety glazing. The finish of the aluminum framing is deteriorating and the system is allowing water penetration into the building. Safety glazing will be installed and the system will be repaired to resolve the water penetration.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs	920	920
Project Management costs (0.0% of TEC)	100	100
Total, Engineering design inspection and administration of construction costs (6.5% of TEC)	1,020	1,020
Construction Phase		
Buildings	8,850	8,850
Inspection, design and project liaison, testing, checkout and acceptance	870	870
Construction Management (11.7% of TEC)	1,820	1,820
Project Management (2.8% of TEC)	430	430
Total, Construction Costs	11,970	11,970
Contingencies		
Design Phase (1.1% of TEC)	170	170
Construction Phase (15.6% of TEC)	2,440	2,440
Total, Contingencies (16.7% of TEC)	2,610	2,610
Total, Line Item Cost (TEC)	15,600	15,600

5. Method of Performance

Overall project management, quality assurance, supervision of design and construction efforts and coordination with the U.S. Department of Energy for this project will be the responsibility of the Fermi National Accelerator Laboratory, through the Facilities Engineering Services Section (FESS). Design will be accomplished by a combination of FESS staff and consultant A/E fixed price contracts under the direction of the Facilities Engineering Services Section. Construction for project completion will be accomplished by means of one or more competitively bid, fixed price construction subcontracts. Construction Management and overall project management during the construction phase of this project will remain the responsibility of the Facilities Engineering Services Section of the Fermi National Accelerator Laboratory.

[a] The economic escalation rates from FY 1997 dollars for FY 1999 through FY 2001 are 5.3%, 2.9%, and 2.9% respectively from the Department Price Change Index FY 1999 Guidance, General Construction.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Total, Line item TEC	0	0	1,690	6,340	7,570	15,600
Other Project Costs						
Conceptual design cost	530	270	0	0	0	800
Other project-related costs[a]	0	0	560	380	1,460	2,400
Total, Other Project Costs	530	270	560	380	1,460	3,200
Total Project Cost (TPC)	530	270	2,250	6,720	9,030	18,800

7. Related Annual Funding Requirements

	Current Estimate	Previous Estimate
Wilson Hall related annual costs	NA	NA
Incremental utility costs (estimate based on FY 1997 rate structure)	NA	NA
Total related annual funding *(operating from FY 2003 through FY 2007)*[b]	NA	NA

[a] Includes funding for relocation of tenants before and after the construction and rebuilding of their workspaces; refurbishment of existing elevators which will be used for construction purposes, and then restored to public use.

[b] No incremental annual operating costs will result from the completion of this project.

00-G-307, Research Office Building, Stanford Linear Accelerator Center, Stanford, California

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request	1Q '00	3Q '00	4Q '00	4Q '01	7,200	7,430

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Construction			
2000	2,000	2,000	950
2001	5,200	5,200	6,250

3. Project Description, Justification and Scope

The new Central Office Building project will construct a two-story building with approximately 30,000 gross square feet that will provide permanent, energy efficient office and conference space to meet the needs of the Laboratory. The office building will be located immediately adjacent to and north of the existing SLAC Administrative and Engineering building in the central campus area of the Laboratory. The new government-owned facility described herein will be located on leased land. Features include fixed and flexible office areas, meeting rooms and conference facilities equipped with interior office furnishings. Conventional utilities, such as domestic water, sanitary sewer, HVAC, and electrical power, will be provided by short connections from existing services. Specialized utilities include HVAC control and equipment, telecommunication for video and computers, and the main electrical feed. Construction of this building will allow the demolition of thirteen very old, temporary structures, totaling approximately 20,000 square feet.

This building will provide adequate facilities for the BaBar experimental program. This experimental program is critical to delivering the scientific understanding necessary to the success of the DOE's and the Nation's long-term science objective of maintaining the U.S. high energy physics program at the forefront of basics research.

With the increasing level of activity associated with the BaBar collaboration and SLAC's on-going high energy physics (HEP) experimental program, SLAC's space requirements are projected to exceed the capacity of currently existing office and meeting facilities. The BaBar experiment, which is scheduled to begin operation in FY 1999, expects a large influx of Users who will require adequate office and support

space. SLAC expects to host approximately 1,100 HEP Users per year when the BaBar experiment begins full scale operations. The BaBar collaboration itself, consists of over six hundred users from around the world representing over seventy institutions. Office and meeting space is urgently needed to meet the demand created by this mega-collaboration. In the past, SLAC has only had about 200 collaborators/users in residence at any one time. Even at this level, most are housed in less than adequate facilities (the User community has become even more vocal about this in the past year or two). In the BaBar era, SLAC expects substantially more Users to be in residence and, as a national user facility, SLAC needs to be in a position to provide adequate space for them.

SLAC has investigated leasing and conversion alternatives to meet the projected need for office space but none has been judged to be as cost effective or satisfactory as the addition of the new office building. It was determined that there was insufficient off-site office space available nearby for leasing (12,000 square feet with a rental cost of $1,000,000 per year was available). Conversion of existing temporary and permanent facilities is not cost effective because the cost of renovation, necessary seismic and ADA work is roughly equal to the cost of new construction and the resulting space is inferior to new space specifically designed for office use. Additionally, valuable industrial space would be lost.

The use of substandard facilities could meet approximately two-thirds of this projected need but at substantial cost for necessary remedial work. With improved operating and energy efficiencies, it is estimated that the annual operating costs for this 30,000 square foot building will be equal to the current operating costs of the 20,000 square feet of temporary space to be removed.

If the new Central Office Building is not constructed, operating efficiencies and cost savings cannot be achieved, existing temporary structures, which are maintenance intensive and energy inefficient cannot be eliminated, the cost of seismic and ADA retrofitting will not be avoided, and parking will continue to be an operational deficiency in the main Computer Center area. Vehicular and pedestrian safety will not be improved. Commitments made to Stanford University and the SLAC HEP User population will not be met. An estimated $2,000,000 of avoidable costs will be incurred.

Funding is requested to initiate Preliminary and Final Design (Title I and II) of the project, procuring an Architect/Engineering firm to develop and oversee design, procure equipment, and begin construction.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (5.8% of total estimated cost (TEC))	419	NA
Design Management costs at 23% of Preliminary and Final Design	98	NA
Project Management costs at 23% of Preliminary and Final Design	98	NA
Total, Design Phase	615	NA
Construction Phase		
Building	4,727	NA
Specialized Utilities	519	NA
Standard Equipment	496	NA
Construction Management at 2% of above	113	NA
Project Management at 1.5% of above	85	NA
Total, Construction Costs	5,940	NA
Contingencies at approximately 10 percent of above costs		
Design Phase (0.8% of TEC)	61	NA
Construction Phase (8.1% of TEC)	584	NA
Total, Contingencies	645	NA
Total, line item costs	7,200	NA

5. Method of Performance

Construction and procurement shall be accomplished by fixed price subcontracts on the basis of competitive bidding. Design and inspection shall be performed by the laboratory and contracted Architect-Engineers.

[a] Escalated to mid-point of construction with a factor of 1.0611. Allocated Indirects included in costs.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Design	0	0	0	615	0	615
Construction	0	0	0	335	6,250	6,585
Total Facility Costs (TEC)	0	0	0	950	6,250	7,200
Other Project Costs						
Conceptual design cost	0	0	30	0	0	30
Other project related costs[a]	0	0	0	0	200	200
Total, Other Project Costs	0	0	30	0	200	230
Total Project Cost (TPC)	0	0	30	950	6,450	7,430

7. Related Annual Funding Requirements

(FY 1998 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility maintenance/repair costs[b]	34	NA
Incremental utility costs[c]	36	NA
Total related annual funding	70	NA
Total Operating costs (operating from FY 2003 through FY 2007)	350	NA

[a] Includes funding for demolition of temporary structures; paving.

[b] Includes costs for janitorial services.

[c] Includes incremental utility costs for electric power and water.

Nuclear Physics

Program Mission

The Nuclear Physics program of the Department of Energy (DOE) has the lead responsibility for Federal support of nuclear physics research and supports fundamental research activities under the mandate provided in Public Law 95-91 which established the Department. The primary mission of the program is to develop and support the basic research scientists and facilities, and to foster the technical and scientific activities needed to understand the structure and interactions of atomic nuclei, and to understand the fundamental forces and particles of nature as manifested in nuclear matter. Atomic nuclei can be described as a collection of nucleons (protons and neutrons), bound together by the mechanism of exchange of mesons, mainly pi mesons (pions). The research forefront in nuclear physics now includes incorporation of the quark substructure of the nucleon into the understanding of nuclear structure and of quark-antiquark pairs to form the mesons. Quarks, which are the most elementary building blocks of matter, are bound together in groups of three by the exchange of gluons to form the nucleons.

Attendant upon this core mission are responsibilities to enlarge and diversify the Nation's pool of technically trained talent and to facilitate transfer of technology and knowledge acquired to support the Nation's economic base. The program works in close coordination with the Nuclear Physics program at the National Science Foundation (NSF), and jointly with the NSF charters the Nuclear Science Advisory Committee to advise on setting scientific priorities.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goal

Understand the structure of atomic nuclei and the fundamental forces required to hold their constituents in place, based on a series of systematic experimental and theoretical scientific investigations.

Program Objectives

- Conduct a program of maximum effectiveness to provide new insights into the nature of energy and subatomic matter, based on evaluation by rigorous peer review.
- Conceive, develop, construct, and operate world class scientific accelerator facilities in a timely, and effective manner. In the execution of this responsibility, together with other Science organizations, act as the Nation's leader in developing standards and management techniques to optimize construction and operations of facilities in a cost effective, safe, and environmentally benign way.
- Leverage United States objectives by means of international cooperation through exchanges of scientists and participation in internationally cooperative projects.
- Continue the advanced education and training activities of young scientists to maintain the skills and conceptual underpinning of the Nation's broad array of nuclear related sciences and technologies.

Performance Measures

- Evaluate the scientific quality and appropriateness of the total DOE Nuclear Physics program to maintain the United States position as world leader in nuclear physics research. Evaluations will be based on rigorous peer reviews conducted by internationally recognized scientific experts. Maintain the highest quality research by taking appropriate corrective management actions based on results of the reviews.
- Determine the production trends of diverse, highly trained young scientists - an essential ingredient for the vitality of the nation's technological base-using the Nuclear Physics annual census of scientific personnel. Funding patterns of university grants will include consideration of the optimum production rate of scientists.
- Use the assistance of technical experts to monitor the performance in scope, costs and schedule of construction projects for world class nuclear physics facilities such as the Relativistic Heavy Ion Collider. Measure project performance against cost and schedule milestones contained in project plans. Working with the relevant DOE project manager and laboratory project management, identify and establish programmatic modifications needed to enable projects to meet schedules and costs.
- Review at least 80 percent of the research projects by appropriate peers and selected through a merit-based competitive process.
- Use peer reviews and user feedback to monitor the effectiveness of facility operations. Evaluate facility performance against objectives set in program guidance based on funding availability, and measure achieved beam hour availability against guidelines developed for the Scientific User Facility Initiative. Identify participation and contributions by foreign scientists at facilities, and obtain input from user's groups at facilities. Develop appropriate facility funding profiles so as to best provide overall beam availability for the Nuclear Physics program.
- Measure overall program against the scientific priorities recommended in the long range plans that are regularly provided by the DOE/NSF Nuclear Science Advisory Committee (NSAC). Obtain assessments from NSAC and other community forums on the overall direction of the DOE Nuclear Physics program and its coordination with the NSF Nuclear Physics program. Based on this feedback, programmatic changes will be made, where necessary, to assure the Nuclear Physics program is appropriately directed towards highest priority topics in the long range plan.
- Upgrades of scientific facilities will be managed to keep them on schedule and within cost.
- Nuclear Physics will begin the research program at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL) in FY 2000.

Significant Accomplishments and Program Shifts

Medium Energy Nuclear Physics

- In FY 2000, operations of the MIT/Bates Linear Accelerator Center facility will be terminated and Decommissioning and Decontamination (D&D) activities will begin.

- All three experimental halls at the Thomas Jefferson National Accelerator Facility are now operational for research. Beams of widely differing energies and currents can be delivered simultaneously to each of the halls to meet the specific requirements of the experiments. The laboratory is now also able to deliver polarized beam to any of the experimental halls.

Heavy Ion Nuclear Physics

- The Relativistic Heavy Ion Collider (RHIC) construction project at Brookhaven National Laboratory (BNL) continues on scope and budget with a completion date of the third Quarter of FY 1999. Fabrication of RHIC detectors, including the additional experimental equipment recommended by NSAC for purposes of particle detection and data analysis, also proceeds on schedule.

  In FY 2000 RHIC initiates its first full year of Operations and its research program will begin with four experiments (STAR, PHENIX, BRAHMS and PHOBOS) involving over 900 researchers and students from 80 institutions and 15 countries. The BNL Tandem/AGS/Booster accelerator complex, which acts as the injector for RHIC, will terminate routine operations of its fixed-target heavy-ion research program.

Low Energy Nuclear Physics

- Construction of the US/Canadian Sudbury Neutrino Observatory (SNO) detector, which sits in a nickel mine 6,800 feet below the surface of the earth, was completed in FY 1998. A dedication of the laboratory was held in Sudbury, Ontario, on May 28, 1998, with Stephen Hawking as one of the speakers. The filling of the region around the detector with water, and the central part of the detector with "heavy water" (D_2O), is now underway and initial measurements using the detector have commenced early in calendar year 1999.
- Gammasphere was moved from the 88-Inch Cyclotron at Lawrence Berkeley National Laboratory (LBNL) to the ATLAS facility at Argonne National Laboratory (ANL) in FY 1998. A research program at ATLAS was initiated which is focused on the study of the structure of nuclei far from stability utilizing Gammasphere coupled with the existing Fragment Mass Analyzer (FMA). It is now planned that Gammasphere will operate at ATLAS in FY 1999 and move back to the 88-inch Cyclotron in FY 2000.
- The Radioactive Ion Beam (RIB) facility at Oak Ridge National Laboratory (ORNL) successfully developed new beams in FY 1998 and has initiated a series of experiments directed at measuring cross sections important to astrophysics.

Nuclear Theory

- In FY 2000 the Nuclear Theory Institute at the University of Washington continues its activities as a premier international center for new initiatives and collaborations in nuclear theory research.

Scientific Facilities Utilization

The Nuclear Physics request includes $234,000,000 to maintain support of the Department's scientific user facilities. This funding will provide research time for thousands of scientists in universities, Federal agencies, and U.S. companies. It will also leverage both Federally and privately sponsored research consistent with the Administration's strategy for enhancing the U.S. National science investment.

Funding of Contractor Security Clearances

In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $106,000 and $88,000 for estimated contractor security clearances in FY 1999 and FY 2000, respectively, within the decision unit.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Nuclear Physics					
Medium Energy Nuclear Physics	113,400	118,698	-155	118,543	111,130
Heavy Ion Nuclear Physics	94,736	150,592	-185	150,407	181,810
Low Energy Nuclear Physics	31,872	33,360	-135	33,225	34,170
Nuclear Theory	15,330	15,830	-70	15,760	15,830
Subtotal, Nuclear Physics	255,338	318,480	-545	317,935	342,940
Construction	59,400	16,620	0	16,620	0
Subtotal, Nuclear Physics	314,738	335,100	-545	334,555	342,940
Use of Prior Year Balances	-971 [a]	-776 [a]	0	-776 [a]	0
General Reduction	0	-545	+545	0	0
Total, Nuclear Physics	313,767 [b]	333,779	0	333,779	342,940

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction of use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Excludes $5,660,000 which has been transferred to the SBIR program and $340,000 which has been transferred to the STTR program.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	10,783	9,750	10,260	+510	+5.2%
Chicago Operations Office					
Argonne National Laboratory	16,845	16,045	17,485	+1,440	+9.0%
Brookhaven National Laboratory	110,851	115,900	135,549	+19,649	+16.9%
Total, Chicago Operations Office	127,696	131,945	153,034	+21,089	+16.0%
Idaho Operations Office					
Idaho National Engineering Laboratory	90	80	80	0	0.0%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	21,965	22,118	18,080	-4,038	-18.3%
Lawrence Livermore National Laboratory	845	660	950	+290	+43.9%
Stanford Linear Accelerator Center	9	0	0	0	0.0%
Total, Oakland Operations Office	22,819	22,778	19,030	-3,748	-16.4%
Oak Ridge Operations Office					
Thomas Jefferson National Accelerator Facility	68,850	70,305	73,669	+3,364	+4.8%
Oak Ridge National Laboratory	16,215	15,017	16,665	+1,648	+11.0%
Oak Ridge Institute for Science & Education	719	565	820	+255	+45.1%
Total, Oak Ridge Operations Office	85,784	85,887	91,154	+5,267	+6.1%
All Other Sites [a]	67,566	84,115	69,382	-14,733	-17.5%
Subtotal, Nuclear Physics	314,738	334,555	342,940	+8,385	+2.5%
Use of Prior Year balances	-971 [b]	-776 [b]	0	+776 [b]	+100.0%
Total, Nuclear Physics	313,767	333,779	342,940	+9,161	+2.7%

[a] Funding provided to universities, industry, other federal agencies and other miscellaneous contractors.

[b] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Site Description

Argonne National Laboratory (ANL)

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. At Argonne, the Nuclear Physics program supports: (1) the Heavy Ion group, which operates the ATLAS Heavy Ion accelerator as a national user facility, and carries out related research; (2) the Medium Energy group, which carries out a program of research at TJNAF, Fermilab, and DESY in Germany; also supported are activities leading to a "spin" physics program at RHIC; (3) R&D directed at a proposed Isotope Separator On-Line accelerator facility (ISOL); (4) the Nuclear Theory group which carries out theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy and Heavy Ion physics; and (5) data compilation and evaluation activities as part of the national data program.

Brookhaven National Laboratory (BNL)

Brookhaven National Laboratory is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. The major effort at BNL, supported by the Heavy Ion Program, is the new Relativistic Heavy Ion Collider (RHIC) which uses the entire Tandem/Booster and Alternating Gradient Synchrotron (AGS) as an injector. RHIC is a major new and unique international user facility. RHIC will search for the predicted "quark-gluon plasma," a form of nuclear matter not previously observed. The Medium Energy group has been supported to carry out a program of hypernuclear physics and baryon resonance research using proton beams from the AGS. The Laser Electron Gamma Source (LEGS) group uses a unique polarized photon beam to carry out a program of photonuclear spin physics at the National Synchrotron Light Source (NSLS). The BNL Nuclear Theory group provides theoretical support and investigations primarily in the area of relativistic heavy ion physics. Low Energy support is provided for detector and chemical analysis development for the Sudbury Neutrino Observatory (SNO) and involvement in the SNO research program. BNL is also the central U.S. site for the American and international nuclear data and compilation effort. The National Nuclear Data Center is housed at BNL.

Idaho National Engineering & Environmental Laboratory (INEEL)

Idaho National Engineering and Environmental Laboratory is a Multiprogram Laboratory located on 572,000 acres in Idaho Falls, Idaho. At INEEL, a program of nuclear data and compilation is supported.

Lawrence Berkeley National Laboratory (LBNL)

Lawrence Berkeley National Laboratory is a Multiprogram Laboratory located in Berkeley, California. The Lab is on a 200 acre site adjacent to the Berkeley campus of the University of California. At LBNL, the Nuclear Physics program supports: (1) operations and research at the 88-inch Cyclotron, a heavy ion accelerator which is run as a national user facility; (2) the Relativistic Nuclear Collisions group, with activities at CERN/SPS, BNL/AGS, and RHIC, where they have been major players in the development of the large STAR detector for the new RHIC facility; (3) the Low Energy group, which plays a major role in the construction and implementation of the Sudbury Neutrino Observatory (SNO) detector; (4) the Nuclear Theory group, which carries out a program with emphasis on theory of relativistic heavy ion physics; and (5) the Nuclear Data group whose activities support the National Nuclear Data Center at BNL.

Lawrence Livermore National Laboratory (LLNL)

Lawrence Livermore National Laboratory is a Multiprogram Laboratory located on a 821 acre site in Livermore, California. Low Energy Research support is provided for the setup and use of the GENIE detector for a program of neutron research using LANSCE beams at Los Alamos National Laboratory. A nuclear data and compilation effort is supported at LLNL.

Los Alamos National Laboratory (LANL)

Los Alamos National Laboratory is a Multiprogram Laboratory located on a 27,000 acre site in Los Alamos, New Mexico. Nuclear Physics supports a broad program of research including: (1) the Liquid Scintillation Neutrino Detector (LSND) experiment which is searching for evidence of neutrino oscillations, and a program of neutron beam research investigating parity violation in nuclei; these activities utilize beams from the LANSCE proton accelerator; (2) a major effort to build components of the PHENIX detector for the new Relativistic Heavy Ion Collider (RHIC) at Brookhaven, as well as to carry out a program of heavy ion research; (3) research is supported to study the quark substructure of the nucleon in experiments at Fermilab, and to plan for the detectors and research for a "spin" physics program at RHIC which will utilize polarized proton beams; (4) the development of the Sudbury Neutrino Observatory (SNO) detector as well as involvement in the planned research program; (5) a broad program of theoretical research into a number of topics in nuclear physics; (6) Nuclear data and compilation activities as part of the national nuclear data program.

Oak Ridge Institute for Science and Education (ORISE)

Oak Ridge Institute for Science and Education is located on a 150 acre site in Oak Ridge, Tennessee. Nuclear Physics support is provided through ORISE for activities in support of the new Radioactive Ion Beam Facility (RIB) and its research program.

Oak Ridge National Laboratory (ORNL)

Oak Ridge National Laboratory is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. The major effort at ORNL is the Low Energy program support for research and operations of the new Radioactive Ion Beam Facility (RIB), which is run as a national user facility. RIB allows a program of experimental research investigating a number of issues in astrophysics. Also supported is a heavy ion group which is involved in PHENIX detector development activities for RHIC and the development of the RHIC research program. The theoretical nuclear physics effort at ORNL emphasizes investigations of low energy nuclear structure. Nuclear data and compilation activities are also supported as part of the national nuclear data effort.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center (SLAC) is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. SLAC uses computational tools (i.e. simulations, interactive techniques, remote access to instrumentation for data collection and manipulation), in partnership with educational institutions, for teaching and learning science as it relates to the Office of Science's Nuclear Physics mission.

Thomas Jefferson National Accelerator Facility (TJNAF)

Thomas Jefferson National Accelerator Facility is a program-dedicated laboratory (Nuclear Physics) located on 273 acres in Newport News, Virginia. Major Medium Energy program support is provided for the operation and research program of TJNAF, a new and unique international user facility for the investigation of nuclear and nucleon structure based on the underlying quark substructure. Also supported is a nuclear theory group whose program of investigations support the experimental program of the laboratory. The Nuclear Physics program provides most of the support for this new single purpose laboratory.

All Other Sites

The Nuclear Physics program funds research at 83 colleges/universities located in 35 states. This line also includes funding of research awaiting distribution pending completion of peer review results.

Medium Energy Nuclear Physics

Mission Supporting Goals and Objectives

The Nuclear Physics Program supports the basic research necessary to identify and understand the fundamental features of atomic nuclei and their interactions. The Medium Energy Nuclear Physics subprogram supports academic fundamental research, and facility operations and research at electron and proton accelerator facilities at the higher energies of interest to nuclear physics. In addition, the subprogram supports research at accelerators operated by other Department of Energy programs (e.g., High Energy Physics and Basic Energy Sciences) and at other unique domestic or foreign facilities. The research programs are ultimately aimed at achieving an understanding of the structure of the atomic nucleus in terms of the quarks and gluons, the objects which are believed to combine in different ways to make all the other sub-atomic particles. Just as important is the achievement of an understanding of the "strong force", one of only four forces in nature, and the one which holds the nucleus of the atom together. Research efforts include studies of the role of excited states of protons and neutrons in nuclear structure, investigations of the role of specific quarks in the structure of protons and neutrons, studies of the symmetries in the behavior of the laws of physics, investigations of how the properties of protons and neutrons change when imbedded in the nuclear medium, measurements with beams of electrons or protons whose "spins" have all been lined up in the same direction (polarizing the beams) to determine unique "structure functions", and studies of how particles interact with each other inside the nucleus. Two national accelerator facilities are operated entirely under the Medium Energy subprogram - the Thomas Jefferson National Accelerator Facility (TJNAF) in Newport News, Virginia, operated by the Southeastern Universities Research Association and the Bates Linear Accelerator Center in Middleton, Massachusetts, operated by the Massachusetts Institute of Technology. These accelerator facilities serve a nationwide community of Department of Energy and National Science Foundation supported scientists from over 100 American institutions, of which over 90% are universities. Both facilities provide major contributions to American education at all levels. At both TJNAF and Bates, the National Science Foundation (NSF) has made a major contribution to new experimental apparatus in support of the large number of NSF users. A significant number of foreign scientists collaborate in the research programs of both facilities. The planned research program at the new TJNAF, for example, involves 600 scientists from 17 foreign countries; 81 of these scientists are from Conseil Europeen pour la Recherche Nucleaire (CERN) member states. At TJNAF, foreign collaborators have also made major investments in experimental equipment. Nuclear Physics will provide opportunities for college faculty and students to spend time at DOE laboratories, to participate in world-class research projects. Faculty/Student Science Teams will visit our DOE Laboratories during the academic summer/semesters, be involved in conducting research, writing proposals, utilizing technology and pursuing technical or scientific careers. Primary goals of the Science Teams are to build long-term partnerships among DOE laboratories and provide faculty/students with a deeper understanding of DOE science associated needs for research and development. Funds will be provided to pay for faculty/student stipends, travel, housing and subsidize laboratory scientists' time for this activity ($973,000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Research					
University Research	16,080	17,085	15,662	-1,423	-8.3%
National Laboratory Research	19,713	20,124	19,985	-139	-0.7%
Other Research	987	6,064	5,748	-316	-5.2%
Subtotal, Research	36,780	43,273	41,395	-1,878	-4.3%
Operations					
TJNAF Operations	62,720	64,170	67,235	+3,065	+4.8%
Bates Operations	13,550	10,800	2,500	-8,300	-76.9%
Other Operations	350	300	0	-300	-100.0%
Subtotal, Operations	76,620	75,270	69,735	-5,535	-7.4%
Total, Medium Energy Nuclear Physics	113,400	118,543	111,130	-7,413	-6.3%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Research

University Research

These activities comprise a broad program of research, and includes 40 grants at 32 universities in 17 states and the District of Columbia. These research efforts utilize not only each of the accelerator facilities supported under the Medium Energy program, but also use other U.S. and international accelerator laboratories. Included in "Bates Research" is the effort performed at the MIT/Bates Linear Accelerator Center by MIT scientists. "Other University Research" includes all other university-based efforts using many research facilities, including MIT activities which are not carried out at Bates.

- **Bates Research:** At the MIT/Bates accelerator, university researchers have been carrying out "symmetry violation" studies on the proton in the North Experimental Hall. Out-of-plane measurements are being carried out using new spectrometers in the South Experimental Hall on the proton, deuteron, and complex nuclei including measurements of the transition of the proton to its excited state.
  - In FY 1999, important measurements will be completed in a limited experimental program.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ In FY 2000, the Bates accelerator will terminate operations. Supported MIT scientists will transition to other research facilities.	2,900	4,600	1,500
■ **Other University Research:**			
▸ University scientists are collaborating on important ongoing and future experiments at TJNAF. In FY 2000 activities include studies of the charge structure of the neutron in Hall C, planned measurements of the electric form factor of the proton, and a series of planned studies of the excited states of the proton in Hall B. First parity-violation measurements to look for the "strange quark" content of the proton in Hall A are already underway.			
▸ A number of university groups are collaborating in experiments using the new out-of-plane spectrometers in the South Experimental Hall at the Bates Laboratory. In FY 2000 Bates will cease operations; MIT and other university scientists will transition to other research facilities. Part of the Bates research funds are being added to other university research to support this transition.			
▸ University scientists and National Laboratory collaborators will continue to carry out the HERMES experiment at the DESY laboratory in Hamburg, Germany. This experiment will measure what components of the proton or neutron determine the "spin" of these particles, an important and timely scientific issue. In FY 2000, HERMES will utilize a new Ring Imaging Cerenkov counter for particle identification.			
▸ A new underground neutrino detector in Arizona is beginning a search for neutrino oscillations using the Palo Verde nuclear power reactors as the source of neutrinos. If neutrino oscillations are observed, implying neutrinos have mass, there would be a major impact on our understanding of the laws of physics. In FY 2000, the program will be completing its data-taking phase, and analysis will be underway.	13,180	12,485	14,162
Total, University Research	16,080	17,085	15,662

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
National Laboratory Research			
Included is: (1) the research supported at the Thomas Jefferson National Accelerator Facility, which houses the Nation's new and unique high intensity continuous wave electron accelerator and (2) research efforts at Argonne, Brookhaven, and Los Alamos National Laboratories. The National Laboratory groups carry out research at various world facilities as well as at their home institutions			
■ **TJNAF Research:**			
▸ Scientists at TJNAF, with support of the user community, have completed assembly of new experimental apparatus for Halls A, B, and C. All three experimental Halls are now operational. TJNAF scientists provide experimental support and operate the apparatus for safe and effective utilization by the user community. TJNAF scientists participate in the laboratory's research program, and collaborate in research at other facilities.			
▸ Eight experiments have been completed in Hall C. Experimental equipment in Hall A is complete and the experimental program is underway. Four experiments have completed data accumulation in Hall A. The complex large-acceptance spectrometer in Hall B has been completed and the research program is now underway. One experiment has been completed. In FY 2000, the experimental program will run routinely in all three Halls.			
▸ Capital equipment funding will be provided for assembling and installing polarized electron injector improvements for the accelerator. Capital equipment funds will be used to install ancillary equipment items such as polarized targets for experimental Halls A, B, and C spectrometer systems, complete a major upgrade of the data reduction system to handle massive amounts of raw data, and to continue fabrication of second generation experiments such as a spectrometer that is designed to investigate the strange quark content of the proton.	5,600	5,600	5,700

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Other National Laboratory Research:**			
▸ Argonne National Laboratory scientists are pursuing research programs at TJNAF, at the DESY Laboratory in Germany, and have proposed measurements of the quark structure of the nucleon at the new Main Injector at Fermilab. The theme running through this entire effort is the search for a detailed understanding of the internal structure of the nucleon.			
▸ At Brookhaven National Laboratory, scientists at the Alternating Gradient Synchrotron have been working with university researchers on experiments to look at the behavior of strange quarks in nuclei, and other work has been investigating the spectroscopy of strongly interacting particles. These efforts involve large detectors which were recently moved from Los Alamos and the Stanford Linear Accelerator Center. In FY 2000, efforts involving analysis of data obtained in prior years will be supported. The AGS will be primarily utilized as an injector for the new Relativistic Heavy Ion Collider (RHIC).			
▸ Also at Brookhaven, Laser Electron Gamma Source (LEGS) scientists are developing a new spectrometer and polarized target for a new program of spin physics. This unique facility produces its high energy polarized "gammas" by back scattering laser light from the circulating electron beam at the National Synchrotron Light Source (NSLS). In FY 2000, the research program utilizing the new equipment, will be fully underway.			
▸ At Los Alamos National Laboratory, scientists and collaborators may continue to carry out highly interesting but controversial measurements in search of neutrino oscillations. If oscillations are found, then neutrinos would have mass, in disagreement with our present understanding of the laws of physics.			
▸ Los Alamos National Laboratory scientists and collaborators are also developing detectors for the Relativistic Heavy Ion Collider which will enable use of polarized protons and which builds upon an experiment to measure the quark structure of the proton at Fermilab. . .	14,113	14,524	14,285
Total, National Laboratory Research	19,713	20,124	19,985

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Research			
■ **SBIR/STTR:** Amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs and other established obligations which the Medium Energy Nuclear Physics subprogram must meet.			
▸ In FY 1998 $4,165,000 and $340,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	987	6,064	5,748
Total, Research	36,780	43,273	41,395

Operations

TJNAF Operations

Included is the funding which supports: (1) operation of the Continuous Electron Beam Accelerator at the Thomas Jefferson National Accelerator Facility, and (2) major manpower, equipment, and staging support for the assembly and dismantling of complex experiments.

■ **TJNAF Accelerator Operations:**

▸ The accelerator is now capable of delivering beams of differing energies and currents simultaneously to the three experimental halls. Polarized beam capability is now also available and is being used for experiments.

	(hours of beam for research)		
	FY 1998	FY 1999	FY 2000
TJNAF	4,500	4,500	4,500

▸ AIP funding will provide for polarized injector and beam handling components which enable simultaneous polarized beam capability with varied operating parameters in the three experimental halls. AIP funding also supports other additions and modifications to the accelerator facilities. GPP funding is provided for minor new construction and utility systems.	39,755	41,200	43,360

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **TJNAF Experimental Support:**			
▸ Support is provided for the scientific and technical manpower, materials, and services needed to integrate rapid assembly, modification, and disassembly of large and complex experiments for optimization of schedules. This includes the delivery or dismantling of cryogenic systems, electricity, water for cooling, radiation shielding, and special equipment for specific experiments.	22,965	22,970	23,875
Total, TJNAF Operations	62,720	64,170	67,235
Bates Operations			
■ Funding is provided to support accelerator operations at the MIT/Bates Linear Accelerator Center.			
▸ Bates operations will terminate in FY 2000. Funding is provided for Decommissioning and Decontamination activities.			
	(hours of beam for research)		
	FY 1998	FY 1999	FY 2000
Bates	2,000	1,000	0
▸ Accelerator operations in FY 1998 provided beams for the research programs in the North and South Halls, for testing of internal continuous beams in the South Hall Ring, and for development of extracted continuous beams for delivery to the existing South Hall spectrometers.			
▸ AIP funding has supported additions and modifications to the accelerator facilities; GPP funding has provided for minor new construction and utility systems. No AIP/GPP will be provided in FY 2000.	13,550	10,800	2,500
Other Operations			
■ This category includes facility operations funding at other facilities when the importance of the science justifies the partial support of another research facility.			
▸ No operations support of other facilities is planned in FY 2000.	350	300	0
Total, Operations	76,620	75,270	69,735
Total, Medium Energy Nuclear Physics	113,400	118,543	111,130

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Research	
■ **University Research**	
▸ Since Bates facility operations will be terminated in FY 2000, Bates research has been reduced allowing for completion of data analysis only. MIT scientists will transition to other nuclear physics facilities	-3,100
▸ Other university research is increased by the addition of part of the Bates research funds, since a number of the MIT scientists will transfer their research efforts to other facilities.	+1,677
Total, University Research	-1,423
■ **National Laboratory Research**	
▸ TJNAF research support is increased to maintain level of TJNAF scientists in experimental research.	+100
▸ Other National Laboratory research is slightly reduced	-239
Total, National Laboratory Research	-139
■ **Other Research**	
▸ Estimated SBIR/STTR obligations decrease slightly.	-316
Total Research	-1,878
Operations	
■ **TJNAF Operations**	
▸ Funding for the Thomas Jefferson National Accelerator Facility operations is increased to cover increased cost of experiments and cost of living increases.	+2,160
▸ TJNAF experimental support is increased to provide more effective and efficient experimental setup and disassembly to improve scientific output.	+905
Total, TJNAF Operations	+3,065
■ **Bates Operations**	
▸ The MIT/Bates Linear Accelerator Center will cease operations. All planned Capital Equipment, AIP, and GPP funding has been eliminated	-8,300
■ **Other Operations**	
▸ No operations support of other facilities is expected in FY 2000.	-300
Total, Operations	-5,535
Total Funding Change, Medium Energy Nuclear Physics	-7,413

Heavy Ion Nuclear Physics

Mission Supporting Goals and Objectives

The Heavy Ion Nuclear Physics subprogram supports research directed at understanding the properties of atomic nuclei and nuclear matter over the wide range of conditions created in nucleus-nucleus collisions. Using beams of accelerated heavy ions at low bombarding energies, research is focused on the study of the structure of nuclei which are only gently excited (cool nuclear matter), but taken to their limits of deformation and isotopic stability. With higher energy heavy-ion beams it is possible to study highly excited nuclei (warm nuclear matter) which, when sufficiently heated, are expected to vaporize in a process analogous to the liquid-gas phase transition of heated water. At relativistic bombarding energies the properties of hot, dense nuclear matter are studied with a goal of observing the deconfinement of normal matter into a form of matter, a quark-gluon plasma, which is believed to have existed in the early phase of the universe, a millionth of a second after the Big Bang.

Scientists and students at universities and national laboratories are funded to carry out this research on Department of Energy (DOE) supported facilities, as well as on National Science Foundation (NSF) and foreign supported accelerator facilities. The Heavy Ion Nuclear Physics subprogram supports and maintains accelerator facilities located at two universities (Texas A&M and Yale) and three National Laboratories (Argonne, Brookhaven and Berkeley) for these studies. The Relativistic Heavy Ion Collider (RHIC), under construction at Brookhaven National Laboratory since FY 1991, is scheduled to begin operations in the 4th Quarter of FY 1999, initiating a high-priority research program addressing fundamental questions about the nature of nuclear matter. In FY 2000 resources will be directed towards initiating RHIC's research program in its first full year of operation. All the National Laboratory facilities are utilized by DOE, NSF and foreign supported researchers whose experiments undergo peer review prior to approval for beam time. Capital Equipment funds are provided for detector systems, for data acquisition and analysis systems and for accelerator instrumentation for effective utilization of all the national accelerator facilities operated by this subprogram. Accelerator Improvement Project (AIP) funds are provided for additions, modifications, and improvements to the research accelerators and ancillary experimental facilities to maintain and improve the reliability and efficiency of operations, and to provide new experimental capabilities. The Heavy Ion Nuclear Physics subprogram also provides General Purpose Equipment (GPE) and General Plant Project (GPP) funds, for minor new construction, for other capital alterations and additions, and for improvements to land, buildings, and utility systems, for the Brookhaven National Laboratory (BNL) as part of Nuclear Physics' landlord responsibilities for this laboratory.

Performance Measures

- Nuclear Physics will begin the research program at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL) in FY 2000.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Research					
University Research	17,197	16,685	16,965	+280	+1.7%
National Laboratory Research	35,178	38,425	33,450	-4,975	-12.9%
Other Research	86	2,505	2,808	+303	+12.1%
Subtotal, Research	52,461	57,615	53,223	-4,392	-7.6%
Operations					
RHIC Operations	25,520	74,800	106,100	+31,300	+41.8%
National Laboratory Facility Operations	10,805	12,542	13,127	+585	+4.7%
Other Operations	5,950	5,450	9,360	+3,910	+71.7%
Subtotal, Operations	42,275	92,792	128,587	+35,795	+38.6%
Total, Heavy Ion Nuclear Physics	94,736	150,407	181,810	+31,403	+20.9%

Detailed Program Justifications

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Research

University Research

Support is provided for the research of scientists and students from over 30 universities.

- Research using relativistic heavy ion beams, involving about two-thirds of the university scientists supported by the Heavy Ion program, is focused on the study of the production and properties of hot, dense nuclear matter with priorities on the initial experiments at RHIC where an entirely new regime of nuclear matter will become available for study for the first time. University researchers are involved in all aspects (construction, installation and operation) of the four detector systems (STAR, PHENIX, BRAHMS, and PHOBOS) at RHIC.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Research using low energy heavy ion beams, involving about a third of the university scientists, is focused on the study of the structure of nuclei with priorities on studies of highly excited nuclear systems, properties of unstable nuclear systems near the limits where protons and neutrons become unbound and reactions involving unstable nuclei that are of particular importance in nuclear astrophysics. These studies utilize the Gammasphere and Fragment Mass Analyzer Detectors with beams from the ATLAS and 88-inch Cyclotron facilities and complementary studies using the smaller university facilities (Yale and Texas A&M) whose in-house research programs also include an emphasis on student training.	17,197	16,685	16,965
National Laboratory Research			
Support is provided for the research programs of scientists at five National Laboratories (ANL, BNL, LBNL, LANL and ORNL).			
■ **BNL RHIC Research:** Laboratory researchers at BNL play a major role in planning and carrying out the research on the four experiments (STAR, PHENIX, BRAHMS and PHOBOS) at RHIC and have major responsibilities for maintaining, improving and developing this instrumentation for use by the user community. Activities will be focused on initiating a research program in the first full year of RHIC operations. FY 2000 will be a critical year involving continued integration of many different subsystems in the four RHIC detectors to facilitate the beginning of studies of the expected new forms of nuclear matter that will be created in heavy ion collisions at RHIC. The priority for the capital equipment included in this funding is on additional experimental equipment for RHIC, (see Major Items of Equipment) which includes a start in FY 2000 of the Electromagnetic Calorimeter enhancement for STAR whose preliminary TEC is about $5 million. This has been recommended in a NSAC review as important to enhance the physics objectives of the RHIC program. Included are funds for computing for off-line analysis, and enhancements to the baseline STAR and PHENIX detectors that address new physics.	15,247	17,870	12,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Other National Laboratory Research:** Laboratory researchers associated with accelerator facilities at ANL (ATLAS) and LBNL (88-inch Cyclotron) have major responsibilities for maintaining, improving and developing instrumentation for use by the user community at their facilities, as well as playing important roles in carrying out research that address the Program's priorities. Activities will be focused on studies of the properties of short-lived nuclei using specialized instrumentation, studies of nuclear structure with Gammasphere and R&D efforts for the proposed next generation Isotopic Separation On-Line (ISOL) facility for radioactive beams. Researchers at LANL, LBNL, and ORNL will utilize their laboratory competencies in undertaking R&D, management and construction responsibilities for major initiatives such as RHIC detectors (e.g., STAR and PHENIX) and play leadership roles in carrying out research utilizing them. Activities will be focused on initiating a research program in the first full year of RHIC operations. The priorities for capital equipment in this funding are for support for the ongoing research activities at the supported accelerator facilities.	19,931	20,555	21,050
Total, National Laboratory Research	35,178	38,425	33,450
Other Research			
■ Amounts shown are the estimated requirements for the continuation of the SBIR and STTR programs and other established obligations. In FY 1998 $695,000 was transferred to the SBIR program. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	86	2,505	2,808
Total, Heavy Ion Nuclear Physics Research	52,461	57,615	53,223
Operations			
RHIC Operations			
■ The RHIC Project is scheduled to be completed in the 3rd Quarter with commissioning operations beginning in the 4th Quarter of FY 1999. RHIC will be a unique facility whose colliding relativistic heavy ion beams will permit exploration of hot, dense nuclear matter and recreate the transition from			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
quarks to nucleons which characterized the early evolution of the universe. Studies with colliding heavy ion beams will provide researchers with their first laboratory opportunity to explore this new regime of nuclear matter and nuclear interactions which up to now has only been studied theoretically.			
▸ **RHIC/AGS Accelerator Operations:** Support is provided for the operation, maintenance, improvement and enhancement of the RHIC accelerator complex. The RHIC complex includes the Tandem/AGS facility whose fixed-target heavy-ion research program will be terminated in FY 2000 and which will serve as the injector for RHIC. RHIC will begin its first full year of operations with a 33 week running schedule and the goal of 22 weeks (3,300 hours) for research and 11 weeks for accelerator studies.	25,520	66,800	76,675

(hours of beam for research)

	FY 1998	FY 1999	FY 2000
AGS	672	0	0
RHIC	0	500	3,300

▸ **RHIC Experimental Support:** Support is provided for the operation, maintenance, improvement and enhancement of the RHIC experimental complex, including detectors, experimental halls, computing center and support for users. RHIC will initiate its research program in FY 2000 with four experimental detectors (STAR, PHENIX, BRAHMS and PHOBOS). Approximately 1,000 scientists and students from 81 institutions and 15 countries will participate in the research programs of these four experiments.	0	8,000	29,425
Total, RHIC Operations	25,520	74,800	106,100

National Laboratory Facility Operations

Support is provided for two National User Facilities: the ATLAS facility at ANL and the 88-inch Cyclotron facility at LBNL for studies of nuclear reactions, structure and fundamental interactions.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ Support is provided for the operation, maintenance, improvement and enhancement of the ATLAS and 88-inch Cyclotron accelerator facilities. FY 2000 ATLAS and 88-inch operations funding (and beam hours shown below) reflect the move of the Gammasphere program back to the 88-inch Cyclotron and the continued development of radioactive beam capabilities at ATLAS. These facilities are planned to provide yearly hours of beam for research as indicated below. In FY 2000 each facility will carry out about 40 experiments conducted by about 270 researchers.			

(hours of beam for research)

	FY 1998	FY 1999	FY 2000
ATLAS	5,700	5,700	5,300
88-inch Cyclotron	4,500	4,500	5,500
▸ Accelerator Improvement Project (AIP) funds and capital equipment are provided for the maintenance and upgrade of these facilities.	10,805	12,542	13,127
Other Operations			
■ **GPP/GPE:** GPP funding will be provided for minor new construction, other capital alterations and additions, and for buildings and utility systems at Brookhaven National Laboratory (BNL). Funding of this type is essential for maintaining the productivity and usefulness of Department-owned facilities and in meeting its requirement for safe and reliable facilities operation. Since it is difficult to detail this type of project in advance, a continuing evaluation of requirements and priorities may result in additions, deletions, and changes in the currently planned projects. The total estimated cost of each project will not exceed $5,000,000. In addition, the program has landlord responsibility for providing general purpose equipment (GPE) at BNL.	5,950	5,450	9,360
Total, Operations	42,275	92,792	128,587
Total, Heavy Ion Nuclear Physics	94,736	150,407	181,810

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Research	
■ **University Research**	
▸ FY 2000 funding for University Research provides for almost constant effort compared to FY 1999 for research and educational activities.	+280
■ **National Laboratory Research**	
▸ The $3,000,000 of FY 1999 funding provided for experimental support for RHIC detector and computer efforts is shifted in FY 2000 to RHIC Experimental Support Operations. The plans made early in the project to procure computing equipment just prior to operations to secure the most powerful and up-to-date system at the lowest cost, are on schedule. In FY 2000 about $2,500,000 of the capital equipment funding provided in FY 1999 for RHIC computing and experimental equipment projects which expand RHIC scientific capabilities are shifted to RHIC Experimental Support Operations. The buildup of scientific and technical support and infrastructure needed for the RHIC detectors when they become operational in FY 2000, was supported in research in the years preceding the start of RHIC operations. This manpower and infrastructure belongs in RHIC Experimental Support and Operations in FY 2000. FY 2000 operating funding for research at National Laboratories other than BNL is up about $500,000 when compared with FY 1999 and distributed with emphasis on enhanced support for R&D efforts directed towards issues relevant to the proposed ISOL facility for radioactive beams.	-4,975
■ **Other Research**	
▸ Estimated funding for SBIR and other obligations increases from FY 1999.	+303
Total, Research	-4,392
Operations	
■ **RHIC Operations**	
▸ First full year of RHIC operations commences. FY 1999 RHIC Construction funds of $16,620,000 are redirected to Operations. Approximately $5,500,000 of funds provided in FY 1999 to BNL RHIC Research for experimental support activities in preparation of start of RHIC Operations are transferred in FY 2000 to RHIC Operations. The FY 2000 funding provides for an estimated 33 week running schedule	+31,300

	FY 2000 vs. FY 1999 ($000)
■ **National Laboratory Facility Operations**	
▸ In FY 2000 funding for operations of the 88-Inch Cyclotron facility is increased to provide more beam hours for Gammasphere after its arrival from ATLAS. ATLAS operation will be slightly less than the FY 1999 level of effort.	+585
■ **Other Operations**	
▸ With the beginning of RHIC operations the program assumes landlord responsibility for providing general plant projects (GPP) and general purpose equipment (GPE) at BNL and ceases these responsibilities at LBNL.	+3,910
Total, Operations	+35,795
Total Funding Change, Heavy Ion Nuclear Physics	+31,403

Low Energy Nuclear Physics

Mission Supporting Goals and Objectives

The Low Energy Nuclear Physics subprogram supports research directed at addressing issues in nuclear astrophysics, the understanding of the behavior of nucleons at the surface of the nucleus as well as the collective behavior of the entire ensemble of nucleons acting in concert; nuclear reaction mechanisms; and experimental tests of fundamental symmetries. Part of this work can often be accomplished without the use of accelerators. The study of neutrinos from the sun, whose rate of production is not understood, is an example. University-based research is an important feature of the Low Energy subprogram. Since most of the required facilities are relatively small, they are appropriate for siting on university campuses, where they provide unique opportunities for hands-on training of nuclear experimentalists who are so important to the future of this field. Many of these scientists, after obtaining their Ph.D.s, contribute to a wide variety of nuclear technology programs of interest to the DOE. Included in this subprogram are the activities of the National Nuclear Data Center and its support sites that are aimed at providing information services on critical nuclear data and have as a goal the compilation and dissemination of an accurate and complete nuclear data information base that is readily accessible and user oriented.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
University Research	9,447	9,810	10,050	+240	+2.4%
National Laboratory Research	8,468	8,770	8,725	-45	-0.5%
Nuclear Data	5,096	4,900	5,000	+100	+2.0%
RIB Operations	8,840	8,630	9,250	+620	+7.2%
Other	21	1,115	1,145	+30	+2.7%
Total, Low Energy Nuclear Physics	31,872	33,225	34,170	+945	+2.8%

Detailed Program Justifications

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
University Research			
■ The three main components of research at universities in this subprogram are nuclear astrophysics, fundamental interactions in nuclei, and the structure of nuclei. The support level for this activity is determined by juxtaposing the peer review assessment of the worth and priority of the project with the researchers request for the number of graduate students, postdoctoral fellows, other staff and necessary items to complete the proposed work.			
■ Two university accelerators are supported in Low Energy: the University of Washington, Nuclear Physics Laboratory (NPL), and the Triangle Universities Nuclear Laboratory (TUNL) facility at Duke University. These small university facilities fit within the low energy program by providing a source of light ion and neutron physics beams. Long term measurements of a detailed nature are possible at these dedicated facilities and they are used to make measurements that address questions of a fundamental physics nature.			
■ University scientists perform research at on-site facilities, as user groups at National Laboratory facilities, and at the Sudbury Neutrino Observatory (SNO). These activities address fundamental issues essential to the long term goal of understanding the production and constituents of stars.	9,447	9,810	10,050
National Laboratory Research			
■ **Radioactive Ion Beam Facility Research:**			
▸ The RIB facility will focus mainly on nuclear astrophysics problems bearing on the creation of the elements and nuclear properties with extreme proton/neutron ratios.			
▸ Installation of the Daresbury Recoil Separator, a $2,000,000 device contributed by the United Kingdom, allows separation of the products of nuclear reactions from particles a trillion times more intense, enabling the measurement of nuclear reactions that fuel the explosion of stars.			
▸ Capital equipment funds are provided to expand the list of available beam species.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ There will be an increased level of effort dedicated to research and development leading to an advanced RIB facility.	5,313	4,615	5,400
■ **Other National Laboratory Research:**			
▸ In a major effort to study the processes that control our sun, the Sudbury Neutrino Observatory (SNO) was created. This observatory consists of a 40 foot diameter plastic (acrylic) vessel that holds 1,000 tons of heavy water that is the solar neutrino detector. The SNO laboratory is located 6,800 feet underground. The detector water fill will be completed in FY 1999 and data taking will start. The level of SNO support at the national laboratories is at a continuing level of effort that allows the systematic and efficient collection and analysis of data.			
▸ The research that follows after the completion of filling the tank will determine whether the observed dearth of solar neutrinos results from unexpected properties of the sun, or whether it results from a fundamental new property of neutrinos—namely that neutrinos produced in radioactive decay change their nature during the time it takes them to reach the earth from the sun.			
▸ Capital equipment funds were used to construct and transport special rare gas Helium-3 neutron counters (800m total length) to their underground storage in the ultra low cosmic ray background environment of the SNO mine. They are being stored for a period of time which is sufficient to allow decay to low levels of the radioactivity induced in the detectors by the above ground cosmic ray background.	3,155	4,155	3,325
Total, National Laboratory Research	8,468	8,770	8,725

Nuclear Data

- This is a service function of the Nuclear Physics program which collects, evaluates, stores, and disseminates nuclear information. Its single national and international center point is the United States National Nuclear Data Center (US-NNDC) at Brookhaven National Laboratory. The level of effort is at an ongoing level and was peer reviewed by a panel of experts that addressed the activity level.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The NNDC uses a network of individual nuclear data professionals located in universities and at other national laboratories who assist in assessing data as well as developing new novel, user friendly electronic network capabilities.			
■ The U.S. Nuclear Data Network (USNDN), a collaboration of DOE supported nuclear data scientists, reports to and supports the NNDC in data evaluation and development of on-line access capabilities.			
■ After completion of a review, a new activity, jointly supported with the Nuclear Physics research community, was established in order to serve the nuclear astrophysics community. This will be a joint activity between the US-NNDC and a consortium of researchers and data scientists. This new project, whose level of activity was established by user demand and input, will be an ongoing activity of the Data program.	5,096	4,900	5,000
RIB Operations			
■ The RIB facility is planned to provide beam hours for research as indicated below:			

	(hours of beam for research)		
	FY 1998	FY 1999	FY 2000
RIB	2,200	2,400	2,400

■ Research at the Oak Ridge Electron Linear Accelerator (ORELA), which is also operated by RIB staff, is aimed at resolving discrepancies in the rate of production of primordial elements compared with theoretical predictions, such as models that predict the formation of heavy elements like carbon, nitrogen, and oxygen in the Big Bang.			
■ This technically difficult project, which couples the existing cyclotron and tandem accelerators, was fully operational in FY 1998, and now is operating with radioactive ion beams of arsenic and fluorine as well as beams of Nickel-56.	8,840	8,630	9,250
Other			
■ Amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs. The Lawrence and Fermi Awards which are funded under this line, provide annual monetary awards to honorees selected by the Department of Energy for their outstanding contributions to nuclear science.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **SBIR/STTR:** In FY 1998 $800,000 was transferred to the SBIR program. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	21	1,115	1,145
Total, Low Energy Nuclear Physics	31,872	33,225	34,170

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ **University Research**	
▸ Research associated with RIB experiments and nuclear astrophysics research activities will increase while SNO construction activities will be completed. . . .	+240
■ **National Laboratory Research**	
▸ Increased research in high priority nuclear astrophysics measurements will replace a diminished activity in solar neutrino research.	-45
■ **Nuclear Data**	
▸ Support will increase for activities to provide data and services on-line to replace data and services previously supplied in hard copy.	+100
■ **RIB Operations**	
▸ RIB operations will be maintained with a cost-of-living increase thereby providing a constant amount of beam time.	+620
■ **Other**	
▸ Estimated FY 2000 funds for SBIR increase compared to FY 1999.	+30
Total Funding Change, Low Energy Nuclear Physics	+945

Nuclear Theory

Mission Supporting Goals and Objectives

Theoretical Nuclear Physics is a program of fundamental scientific research that provides new insight into the observed behavior of atomic nuclei. From continuing interaction with experimentalists and experimental data, solvable mathematical models are developed which describe observed nuclear properties, and the predictions of the models are tested with further experiments. From this process evolves a deeper understanding of the nucleus. Traditionally, there are two generic types of nuclear models: (1) microscopic models where the nucleus is viewed as a system of interacting discrete protons and neutrons, and (2) collective models where the nucleus is treated as a drop of fluid. With the establishment of the Quantum Chromodynamics and the standard model, the ultimate goal of nuclear theory now is to understand nuclear models, and hence nuclei, in terms of quarks and gluons. An area of increasing interest recently is in nuclear astrophysics-topics such as supernova explosions, nucleosynthesis of the elements, and the properties of neutrinos from the sun.

The Nuclear Theory program supports all areas of nuclear physics, and is carried out at universities and National Laboratories. Some of the investigations depend crucially on access to forefront computing, and to the development of efficient algorithms to use these forefront devices. Components of the program are selected primarily on the basis of peer review by internationally recognized experts. A very significant component of the program is the Institute for Nuclear Theory (INT), where there is an ongoing series of special topic programs and workshops. The Institute is a seedbed for new collaborations, ideas, and directions in nuclear physics.

Significant progress has been made in the past year. Three examples of particular accomplishments in that period are: (1) University theorists made a significant step forward in our understanding of how and where the heavier elements observed in nature were originally produced, producing strong evidence that they were produced in neutron rich gas at the core of supernova explosions. (2) Theorists at universities and the national laboratories, in several collaborative efforts, have developed increasingly sophisticated models of the reactions between ultra relativistic heavy ions, such as will be produced in the soon to be operating Relativistic Heavy Ion Collider facility at the Brookhaven National Laboratory. In the past year, several new and potentially clear signals of the creation of the quark-gluon plasma in such collisions were suggested by these models. (3) Recently, national laboratory theorists have found, quite unexpectedly, that effects due to special relativity can explain a symmetry in the low lying states of nuclei that is observed in a large number of nuclei, but for which there was previously no satisfactory explanation.

The program is greatly enhanced through interactions with complementary programs overseas and those supported by the National Science Foundation. Many foreign theorists participate on advisory groups and as peer reviewers. There is large participation in the INT by researchers from Europe and Japan.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
University Research	9,974	10,464	10,510	+46	+0.4%
National Laboratory Research	5,356	5,296	5,320	+24	+0.5%
Total, Nuclear Theory	15,330	15,760	15,830	+70	+0.4%

Detailed Program Justifications

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
University Research			
■ Research is conducted through individual grants to faculty at roughly 50 universities.			
■ The range of topics studied through these grants is broad, and each of the active areas of experimental nuclear physics is supported by at least some of the nuclear theory grants.			
■ The overall character of the research program evolves with time to reflect changes in the overall nuclear physics program through redirecting some individual programs, phasing out other programs and starting new programs.			
■ Almost 100 Ph.D. students are supported by the Theory program, the major source of new Ph.D.s in nuclear physics in this country.			
■ The level of effort in this activity has been essentially constant in recent years. The bulk of the funds provided are used for salary support for faculty, postdocs, and students doing thesis research. Thus, a constant level of effort depends on a cost-of-living increase.			
■ The number of nuclear theorists supported in this activity is consistent with the recommendations for manpower levels in the report of the DOE/NSF Nuclear Science Advisory Committee Subcommittee on Nuclear Theory-1988.	9,974	10,464	10,510
National Laboratory Research			
■ Through this activity, small groups of theoretical nuclear physicists are supported at 6 National Laboratories.			
■ The range of topics in these programs is broad, and each of the active areas of experimental nuclear physics is supported by at least some of these nuclear theory activities.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ In all cases, the nuclear theory research at a given laboratory provides support to the experimental programs at the laboratory, or takes advantage of some unique facilities/programs at that laboratory.			
■ The larger size and diversity of the National Laboratory groups make them particularly good sites for the training of nuclear theory postdocs.			
■ The level of effort in this activity has been essentially constant in recent years. The bulk of the funds provided are used for salary support for staff. Thus, a constant level of effort depends on a cost-of-living increase.			
■ The number of nuclear theorists supported in this activity is consistent with the recommendations for manpower levels in the report of the DOE/NSF Nuclear Science Advisory Committee Subcommittee on Nuclear Theory-1988.	5,356	5,296	5,320
Total, Nuclear Theory	15,330	15,760	15,830

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ **University Research**	
▸ Continue program at slightly reduced level of effort, consistent with less than cost-of-living increase in funding.	+46
■ **National Laboratory Research**	
▸ Continue program at slightly reduced level of effort, consistent with less than cost-of-living increase in funding.	+24
Total Funding Change, Nuclear Theory	+70

Capital Operating Expense and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	4,610	4,000	5,655	+1,655	+41.4%
Accelerator Improvement Projects	4,200	4,900	3,900	-1,000	-20.4%
Capital Equipment	26,110	29,586	30,355	+769	+2.6%
Total, Capital Operating Expense	34,920	38,486	39,910	+1,424	+3.7%

Major Items of Equipment *(TEC $2 million or greater)*

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
STAR Silicon Vertex Tracker	7,000	3,450	1,500	1,300	750	FY 2000
PHENIX Muon Arm Instrumentation	11,400	3,375	2,800	2,400	2,525	FY 2001
Analysis System for RHIC Detectors	7,900	775	2,000	3,600	1,525	FY 1999
BLAST Large Acceptance Detector	4,900	400	900	900	0	TBD
STAR EM Calorimeter	TBD [a]	0	0	0	1,800	FY 2002
Total, Major Items of Equipment		8,000	7,200	8,200	6,600	

[a] Preliminary TEC is estimated to be about $5 million.

Biological and Environmental Research

Program Mission

The Biological and Environmental Research (BER) program mission – For over 50 years BER has been investing to advance environmental and biomedical knowledge connected to energy. The BER program provides fundamental science to underpin the business thrusts of the Department's strategic plan. Through its support of peer-reviewed research at national laboratories, universities, and private institutions, the program develops the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy production, development, and use. The research is also designed to provide science in support of the Energy Policy Act of 1992.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goal

To develop the information, scientific "know-how," and technology for identification, characterization, prediction, and mitigation of adverse health and environmental consequences of energy production, development, and use.

Program Objectives

- *To Contribute to a Healthy Citizenry* — Map the fine structure of the human genome by 2003 providing resources to the international research community needed to identify disease genes and develop broad diagnostic and therapeutic strategies, including the development of individual risk assessments; conduct fundamental research necessary for the development of advanced medical technologies and radiopharmaceuticals; and use the unique National Laboratory facilities to determine biological structure and function at the molecular and cellular level in support of this nation's biomedical sciences, pharmaceutical interests, and environmental activities.
- *To Contribute to Cleanup of the Environment* — Conduct fundamental research necessary for the development of advanced remediation tools for containing wastes and cleaning up DOE's contaminated sites, particularly in support of the mission of DOE's Environmental Management (EM) office.
- *To Understand Global Environmental Change* — Acquire the data and develop the understanding necessary to predict how energy production and use can affect the global and regional environment.

Performance Measures

The quality and appropriateness of the Biological and Environmental Research (BER) program and individual research projects are judged by rigorous peer reviews conducted by internationally recognized scientific experts using criteria such as scientific merit, appropriateness of the proposed approach and qualifications of the principal investigator. Highest quality research is maintained by taking appropriate and, if needed, corrective management actions based on results of the reviews. A measure of the quality of the research is the sustained achievement in advancing knowledge as indicated by the publication of research results in refereed scientific journals, by invited participation at national and international conferences and workshops, and by awards received by BER-supported researchers. Progress in the field is also routinely compared to the scientific priorities recommended by the Biological and Environmental Research Advisory Committee and the National Science and Technology Council's (NSTC) committees on Environment and Natural Resources and on Fundamental Science.

An overarching and unique performance measure of the BER program is the diversity of program reviews conducted. This is particularly the case for BER program elements that are components of international research endeavors, e.g., the Human Genome Program and the Global Change Research Program. In addition to panel reviews that evaluate and select individual projects and programmatic reviews by the chartered Biological and Environmental Research Advisory Committee, these program elements are evaluated by interagency (and international) review bodies and by Boards and Committees of the National Academy of Sciences.

The BER program goes one step further in soliciting program reviews. Blue ribbon panels are charged with evaluating the quality of individual programs and with exploring ways of entraining new ideas and research performers from different scientific fields. This strategy is based on the conviction that the most important scientific advances of the new century will occur at the interfaces between scientific disciplines such as biology and information science. Groups like JASON and The Washington Advisory Group (TWAG), involving physicists, mathematicians, engineers, etc., are among the panels that have studied BER program elements such as the Atmospheric Radiation Measurement (ARM) program, climate change prediction activities, the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL), and the Human Genome Program.

Facility operations are also monitored by peer reviews and user feedback. These facilities are provided in a manner that meets user requirements (as indicated by achieving performance specifications while protecting the safety of the workers and the environment); facilities are operated reliably and according to planned schedules; and facilities are maintained and improved at reasonable costs.

Specific BER program performance measures are:

- Excellence in basic research: At least 80 percent of the research projects will be reviewed by appropriate peers and selected through a merit-based competitive process.
- Access to Human Genome research results: BER will complete sequencing of 50 million finished and 70 million high quality draft subunits of human DNA to submit to publicly accessible databases in FY 2000.
- Microbial Genomics: BER will complete the genetic sequencing of over 10 additional microbes with significant potential for waste cleanup and energy production.

- Discovering new biological structures with more than 60 percent of them published in the peer reviewed literature resulting from data generated at synchrotron user stations served by the BER structural biology support facilities program.
- Progress in Boron Neutron Capture Therapy (BNCT) Research: Phase I clinical trials of BNCT at reactor sources of neutrons will be completed for at least 100 patients, and research on a facility for accelerator-based BNCT will be underway. These activities will provide the basis for evaluating the efficacy of BNCT and for designing phase II clinical trials that include reactor and accelerator-based sources of neutrons.
- Atmospheric Radiation Measurement (ARM) accomplishments: BER will conduct five intensive operations periods at the ARM Southern Great Plains site. Data will be obtained from the second station on the North Slope of Alaska. The third station in the Tropical Western Pacific, on Christmas Island, will become operational.
- Work will proceed on the development of the next generation coupled ocean-atmosphere climate model, leading to better information for assessing climate change and variability at regional, rather than global scales. This next generation model will change grid size from the current 300-500 kilometers on a side to less than 200 kilometers on a side.
- Twenty-five AmeriFlux sites representing major types of ecosystem types and land uses in North and Central America, including forests, croplands, grasslands, rangelands and tundra ecosystems, will be operating and collecting data that will allow inter-site comparisons of (1) the atmosphere-terrestrial biosphere exchange of energy and water, (2) the net sequestration of carbon dioxide, (3) the effects of environmental factors such as climate variation on the net exchange of carbon, and (4) the role of biophysical process controlling this exchange. AmeriFlux is a network of instrumented research tower sites designed to provide consistent, quality assured, documented long-term measurements of carbon exchange between the atmosphere and terrestrial biosphere. These measurements are necessary to define the current global carbon dioxide budget, enable improved predictions of future carbon dioxide concentrations, and enhance understanding of how carbon sequestration by the terrestrial biosphere is affected by climate, pollution, land use, and other factors.
- Develop and implement, in cooperation with Basic Energy Sciences, a comprehensive program within the Climate Change Technology Initiative, where the focus areas are those that promise the maximum impact in the area of carbon management in addition to supporting fundamental research that addresses other diverse aspects of the problem.
- Coordinate with other federal agencies, Canada, and Brazil to maximize national and international capabilites to enhance understanding of the current global carbon dioxide distribution and the role of the terrestrial biosphere in that distribution.
- Develop collaborative partnerships between strong marine sciences research institutions and those with developing capabilities to advance innovative techniques in modern molecular biology to understand the coupling between carbon and nitrogen cycles in coastal waters and sediments.
- In cooperation with NASA, NSF, USDA/Forest Service, and the Smithsonian Institution, provide quantitative data on the annual exchange of carbon dioxide between the atmosphere and terrestrial ecosystem from 25 AmeriFlux sites representing major types of ecosystem and land uses in North

Central America. Provide data on both the effects of environmental factors, such as climate variation, on the net sequestration or release of carbon dioxide and the role of biophysical processes controlling the net exchange.

- Environmental remediation developments: The Natural and Accelerated Bioremediation Research (NABIR) program will continue to support fundamental research in environmental and molecular sciences that will underpin the development of bioremediation for containing hazardous waste and cleaning DOE sites. Site characterization of the first NABIR Field Research Center will proceed, and activities necessary to enable research sample distribution to investigators will commence.
- The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) will be identified and cited as an important resource in research publications and research proposals written by investigators in academia and at National Laboratories.
- The development and upgrade of scientific facilities (including experimental stations) will be kept on schedule and within cost.
- The operating time lost at scientific user facilities due to unscheduled downtime will be less than 10 percent of the total scheduled possible operating time, on average.
- Independent assessments will judge BER research programs to have high scientific quality.
- Education accomplishments: The educational activities in the Global Change Research Program will continue to focus on bringing knowledge about the scientific questions and research needs surrounding global environmental change to students at the undergraduate and graduate levels, with an emphasis on DOE mission areas in global change research. Included in these activities are the Summer Undergraduate Research Experience, Graduate Research Environmental Fellowships, and participation in the multi-agency "Significant Opportunities in Atmospheric Research and Science" Program.
- Education accomplishments: Continuing to make 4 to 10 appointments each in the BER Alexander Hollaender Distinguished Post Doctoral Fellowship Program; and the Historical Black Colleges and Universities Faculty and Student Research Programs.

Significant Accomplishments and Program Shifts

Life Sciences

- **TIGR Takes the World of Biology by the Tail** - Three of the hottest eleven papers in biology in 1997 were published by DOE-funded scientist Craig Venter, the president of The Institute for Genomic Research (TIGR). The papers described the complete genomic sequencing of microbes, two of which were funded by the BER Microbial Genome Program. The impact these papers are having emphasizes one of the central principles of both the human and microbial genome programs, that complete genome sequences yield answers to fundamental questions in biology.
- **DOE Joint Genome Institute Second Leading U.S. Producer of DNA Sequence** - In only its first full year of operation, the DOE Joint Genome Institute (JGI) has set ambitious DNA sequencing goals based on international standards for DNA sequence quality. In FY 1998, the JGI became the second leading producer of high quality human DNA sequence among U.S. sequencing

centers. The JGI's monthly sequencing goals and progress are available to the entire scientific community at the JGI Web site, http://www.jgi.doe.gov/Docs/JGI_Seq_Summary.html.

DOE's Bold Human DNA Sequencing Scale Up:

Sequences Submitted to Public Database

FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate
21,000,000 finished	30,000,000 finished	50,000,000 finished
	40,000,000 draft	70,000,000 draft

The Human Genome Program (HGP) was initiated by the Department of Energy (DOE) in 1986 to map and determine the complete DNA sequence of the human genome. The principal goal of this international program is to determine a representative human DNA sequence of all 3 billion base pairs in the human genome. A Memorandum of Understanding was established with the National Institutes of Health (NIH) in 1988 to coordinate the U.S. Genome Project with the international efforts. The new 5 year plan, developed in 1998, calls for determining a draft sequence by FY 2001 and the complete finished sequence of the human genome by the year 2003. The U.S. is responsible for producing approximately 65 percent of the sequence information. The Department of Energy is sequencing 10-14 percent of the genome, a quantity that is proportional to its budget, with NIH responsible for the balance of the U.S. effort.

- **DNA Replication Uncovered** - A team of BER-funded Harvard Medical School researchers have established the 3 dimensional, atom-by-atom structure of an enzyme system responsible for DNA replication. The core enzyme, T7 DNA polymerase, has long been used as a key reagent for determining the sequence of DNA. This work contributes to the development of improved resources and technologies for microbial, human, and other genome sequencing projects and will aid in the rational design of antiviral regimens, whose DNA replication systems are promising targets for drug intervention.

- **Game of 20 Questions (Actually 30) May Speed Hunt for Disease-Causing Genes** - A new research tool, developed at the University of Southern California (USC) by molecular biologist Dr. Norman Arnheim and mathematician Dr. Pavel Pevzner, promises to speed the hunt for disease-causing genes. By using a new technique that resembles a game of "20 Questions," genes can be found buried in human chromosomes in large volumes of so-called "junk DNA" that does not carry information for specific protein products. This new tool has direct applications for research into genetically based human disease.

- **DOE Human Subjects Research Database for FY 1997 on the Web** - The DOE's Human Subjects Research Database (HSRD) has been updated for FY 1997 and is publicly accessible on the World Wide Web at http://www.er.doe.gov/production/ober/humsubj/database.html. The database was begun in response to Congressional interest following the Secretary of Energy Openness Initiative in 1994. The database consists of a detailed description of 252 research projects at 31 facilities, involving the use of human subjects that are supported by DOE or conducted at DOE facilities, ranging from actual experimentation to simple questionnaires.

- **Kidney Disease Gene Discovered with Help of Livermore Scientists** - DOE's investment in building a highly detailed human genetic roadmap for Chromosome 19 is paying off. Lawrence Livermore National Laboratory scientists have teamed with international collaborators in Sweden and Finland to pinpoint the location of a gene on Chromosome 19 that causes congenital nephrotic syndrome, a deadly kidney disease. The disease usually leads to death by age 2 striking about one in 10,000 Finnish children. The discovery has led to a diagnostic tool to test for the gene in parents who may be carriers of the disease and may be a key to understanding how the human kidney filtration process works.
- **Next Generation of Genome Instrumentation** - The genome instrumentation research subprogram that supported basic research leading to widely used gene sequencing methods in capillary electrophoresis and mass spectrometry has been redirected to target needs of genomic science after the completion of the first human genome sequence.
- **New Light on Molecules** - Development of an experimental station for soft x-ray spectroscopy of biologically important molecules is completed at the Advanced Light Source and initial experiments are carried out to evaluate the power of this technology in elucidating biological structures.
- **Genomic Contributions to CCTI** - The BER microbial genome program has made significant investments in the technology that enables genome sequencing at rates previously unattainable. Capitalizing on these investments, the genomes of microbes that produce methane and hydrogen will be sequenced as part of the first awards under the Climate Change Technology Initiative (CCTI). This will enable the identification of the key genetic components of the organisms that regulate the production of these gases. The search for new fuel sources is a key element of a more comprehensive carbon management program. Planning for joint CCTI-related activities with the Office of Fossil Energy was initiated.

Environmental Processes

- **Data on Arctic Ocean Provided** - The Atmospheric Radiation Measurement (ARM) program provided the atmospheric research component of the multi-agency Surface Heat Budget of the Arctic Ocean (SHEBA) experiment. The SHEBA experiment addressed the interactions among sea ice, atmospheric radiation, and clouds in the Arctic and the corresponding effects on polar and global climate. The ARM equipment used during the SHEBA campaign will be modified and redeployed on the North Slope of Alaska in 1999.
- **Looking at Clouds from Both Sides** - The joint ARM-UAV and NASA study of tropical cirrus clouds will have been completed, providing new information on key cloud formations that moderate the radiation budget of the Earth in 1999.
- **Island Effects on Clouds** - The ARM-led, multi-agency and Japanese experimental campaign on Nauru (Tropical Western Pacific) will have obtained new data on the effects of islands in measuring solar radiation and cloud interactions with the oceans in 1999.
- **Lead Role for ARM** - In response to a request from the World Climate Research Program's Global Energy and Water Cycle Experiment (GEWEX) Water Vapor Project, ARM assumed the lead role in developing guidelines for GEWEX observation and data management of this international program.

- **Variance Among Models Decreases** - The Program for Climate Model Diagnosis and Intercomparison continued to be the world's most authoritative effort in analyzing improvements in global climate models with virtually all climate modelers in the world participating. Analysis of the output from 11 different coupled ocean/atmosphere climate models, using a common scenario for increasing atmospheric carbon dioxide, has found that nearly all of the models calculate similar magnitudes for global average warming--about 2 degrees Celsius at the time that carbon dioxide doubles. This is in contrast to earlier studies that found considerable variance among model predictions.
- **More FACTS** - The first phase of the Forest Atmosphere Carbon Transfer and Storage (FACTS-1) experiment was completed. Located in the Duke Forest and developed as a joint effort between Brookhaven National Laboratory and Duke University, FACTS-1 is the first fully operational forest Free Air Carbon Dioxide Enrichment experiment. Data obtained during this phase will be analyzed to provide systematic data necessary to predict the quantity of carbon sequestered by forest vegetation and to understand the response of forest systems when exposed to elevated atmospheric carbon dioxide concentrations.
- **Changing Interannual Variation in Precipitation Impacts Forest Growth** - Experiments at the Throughput Displacement Experiment at the Walker Branch Watershed, Oak Ridge, Tennessee, suggested that if climate change resulted in a 30 percent decline in precipitation, it would alter the regeneration and species composition of deciduous forests in the southeastern U.S. Data also suggest that changes in interannual variation in precipitation, such as increases in drought intensity or frequency, will affect the growth and productivity of forest ecosystems more than would a 30 percent reduction in mean annual precipitation.
- **Data Center Serves the World** - In addition to serving as the international World Data Center for Atmospheric Trace Gases, the Carbon Dioxide Information Analysis Center (CDIAC) serves as the primary global-change data and information analysis center of the U.S. Department of Energy. More than just an archive of data sets and publications, CDIAC enhances the value of its holdings through intensive quality assurance, documentation, and integration. In recognition of this, CDIAC continued to serve as the Quality Systems Science Center for the tri-national North American Research Strategy for Tropospheric Ozone (NARSTO).
- **New Environmental Meteorology Program Initiated** - Capitalizing on the experience and data obtained in prior meteorological studies, the Atmospheric Sciences Program established a new Environmental Meteorology Program, initiating research in vertical transport and mixing and the coupling of these effects to atmospheric chemistry processes involving ozone and small particulate matter. Such research continues to support both the national and international aims of the NARSTO program.
- **Subsurface Science Program Completed** - Phaseout of the Subsurface Science Program activities will be completed in 1999, including the transition of basic research performed under BER sponsorship to the NABIR program and to applied activities supported by the Office of Environmental Management at the Test Area North, Idaho National Engineering and Environmental Laboratory. It was possible to capitalize on these earlier Subsurface Science Program field research activities to provide chemical and microbiological samples for fundamental research in bioremediation to investigators supported under the BER NABIR program.

- **Research on Long-Term Survival of Bacteria Completed** - In partnership with the Seboyetta Spanish Land Grant in rural New Mexico, research on environmental factors that control the long term survival of bacteria that are hundreds of meters deep was completed. The fact that surviving bacteria are also the most starvation-resistant bacteria has important implications for maintaining *in situ* microbial populations for bioremediation at Departmental sites. In completing the research, DOE, Land Grant authorities and residents have jointly reclaimed the drilling site, ensuring full compliance with State and Federal laws.
- **Carbon Sequestration Research Begins Under CCTI** - The carbon sequestration research program will focus on understanding the natural terrestrial sequestration cycle and the natural oceanic sequestration cycle as part of the first awards under the Climate Change Technology Initiative. The ultimate goal is to enhance the natural carbon cycle in both the terrestrial and the oceanic systems. Carbon sequestration is a key element of a more comprehensive carbon management program. Planning for joint CCTI-related activities with the Office of Fossil Energy was initiated.

Environmental Remediation

- **EMSL Attracts Wide Range of Users** - The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) will have completed its second full year of operation as a research laboratory and user facility. In its first three months of operation, the EMSL attracted over 300 users from PNNL, other government laboratories, private industry, and academia, with over half the users coming from academia.
- **First NABIR Field Research Site** - Located at a Departmental site, the first Field Research Center for the Natural and Accelerated Bioremediation Research (NABIR) program will have been selected and field site characterization will have commenced in 1999. In addition to funding the second round of three year awards under the NABIR program, funded investigators are developing research teams that build on the strengths of the individual projects and that begin the process of integrating individual research efforts across the program elements.

Medical Applications and Measurement Science

- **New Tool for Treatment of Stroke** - A Technology Transfer Success: A multi-disciplinary team of scientists and engineers from Lawrence Livermore National Laboratory were honored after receiving the 1998 Federal Laboratory Consortium (FLC) Award for their efforts to develop a new laser technique for the treatment of stroke. The project is an excellent example of how the technology developed for national security missions can be applied successfully in the field of medical devices. The corporate partner involved in this project was EndoVasix, Inc. in Belmont, CA.
- **This is Your Brain on...** - Greater understanding of brain function is being achieved through the application of modern nuclear medicine imaging techniques such as positron emission tomography. Recent work has shown damage to brain function in persons addicted to drugs such as cocaine, this damage reinforces the craving for these drugs.

Scientific Facilities Utilization

The Biological and Environmental Research request includes $40,390,000 to maintain support of the Department's scientific user facilities. Facilities used for structural biology research, such as beam lines at the synchrotron light sources and research reactors are included. The request also includes operation of the William R. Wiley Environmental Molecular Sciences Laboratory where the research activities will underpin environmental remediation. This funding will provide for the operation of the facilities, assuring access for scientists in universities, federal laboratories, and U.S. companies. It will also leverage both federally and privately sponsored research consistent with the Administration's strategy for enhancing the U.S. National science investment.

Climate Change Technology Initiative

Overview

The FY 2000 budget contains two carbon related programs, each of which cut across several agencies. The first is the Climate Change Technology Initiative (CCTI). That part of the CCTI that is within the Office of Science is a joint activity between the Biological and Environmental Research (BER) and Basic Energy Sciences (BES) programs. The second program is the U.S. Global Change Research Program (US/GCRP) that spans eleven agencies and is coordinated through the National Science and Technology Council's Committee on Environment and Natural Resources. Within DOE, the BER program plays the lead role in US/GCRP activities. Although the two programs, CCTI and US/GCRP, are synergistic, they are quite different. US/GCRP research focuses on developing the fundamental understanding of the comprehensive climate system and the global and regional adaptations to it. CCTI focuses on the underpinning fundamental science that will enable mitigation of climate change while maintaining a robust National economy. All research in the CCTI will be peer-reviewed fundamental scientific research; no funds will be devoted to policy studies.

Eighty-five percent of our Nation's energy results from the burning of fossil fuels, a process that adds carbon to the atmosphere — principally in the form of carbon dioxide -- from the sequestered fossil reservoir. Because of the potential environmental impacts of increases in atmospheric carbon dioxide, carbon management has become an international concern and has become the focus of CCTI. A comprehensive carbon management research and development program that meets the needs of the CCTI addresses the diverse aspects of this problem. The Office of Science is well positioned to make significant contributions to the many solutions needed for this problem, as it is set to build on the fundamental discoveries of its core programs and extend them to the new discoveries needed to make carbon management practical and efficient. The Office of Science core programs include research on both carbon and non-carbon energy sources and on both carbon sequestration and carbon recycling. These core activities can now be exploited in the generation of the science that will underpin the technologies of the future. The theme of efficiency in energy production and use must span the entire range of research activities. Research on carbon energy sources, and their impacts, is a focal point of interagency activity through the US/GCRP. Research on non-carbon energy sources is also a focal point of intra-agency activities and is led by the DOE Office of Energy Efficiency and Renewable Energy. The DOE Office of Science, through activities in both the BES program and the BER program, supports research that underpins both efforts.

A research program in carbon management would include research directed at the following themes:

(1) science for efficient technologies,

(2) fundamental science underpinning advances in all low/no carbon energy sources, and

(3) sequestration science.

The Office of Science has long standing programs in fundamental research that already impact these three categories. In FY 2000, resources of $12,656,000 are being requested by BER specifically for the CCTI. The research will be a natural extension of the complementary, ongoing work in several programs in the Office of Science. It will build on the foundation of excellent and relevant research already underway and focus on those areas that build on strengths of the current Office of Science programs and promise maximum impact in the area of carbon management. Within the BER program, the Life Sciences subprogram activities in genomics underpin studies on microorganisms that may form the core of new fuel sources. Core activities within the Environmental Processes subprogram, particularly in terrestrial carbon cycle and in ocean sciences research, open up the possibility of exploiting Nature's own carbon sequestration processes to enhance sequestration.

Immediate Impacts of Expanded Effort in the Science for Climate Change Technology

Additional Office of Science efforts will not only address an immediate societal problem, but will also have a major effect on many scientific disciplines by advancing the state of knowledge and by training students in areas of research that are important to carbon management. For example, biochemistry, molecular and cellular biology, structural biology, and genome science will be impacted, because the production of fuels and chemicals by plants and microorganisms and the interconversion of greenhouse gases requires a better understanding of metabolism, of the structure and function of sub-cellular components, and of enzymes. Similarly, the state-of-the-art in biochemistry, molecular biology, and ecology will be impacted. All of these biological processes are important in understanding the role of marine microorganisms in sequestering carbon. Improvements in combustion to reduce carbon emissions require a fundamental understanding in chemical dynamics and theoretical chemistry and physics. Conversion of sunlight to energy requires an understanding in many areas of science, including photochemistry, photosynthesis, metabolism, and solid state physics. The search for increased efficiency in energy production and use requires fundamental knowledge in ceramics, metals, polymers, solid state chemistry, and condensed matter physics for materials that can withstand higher temperatures, have lower coefficients of friction, and are stronger and lighter. Enhanced recovery of fuel resources and of disposal of carbon dioxide requires a fundamental understanding of geometric, structural, and hydrologic properties of reservoirs and of multiphase, nonlinear transport of fluids in porous and fractured structures. Crosscutting programs in nano- and meso-phase materials involve research at the forefront of materials science, chemistry, engineering, surface science, and semiconductor physics.

The new research efforts supporting advances in low/no carbon energy technologies as well as existing activities, will be closely coordinated with DOE's technology programs and will provide the knowledge base for the development of advanced technologies to reduce carbon dioxide emissions. Many of the activities will impact the Office of Energy Efficiency and Renewable Energy (EE) by providing options for increasing efficiency in automobiles by reducing weight; for increasing efficiency in the use of electricity by increasing the efficiency of electric motors and generators with better magnets; for increasing efficiency in the transmission of electricity by using superconductors; and for reducing energy consumption in manufacturing with improved sensors, controls, and processes. Much of this research

program will provide the knowledge base needed to increase the use of renewable resources with research aimed at understanding the metabolism of carbon dioxide and the metabolic pathways to the production of methane and other biofuels. Other aspects of the research program impact the Office of Fossil Energy (FE) by providing a foundation for effective and safe underground sequestration, new materials, a better understanding of combustion, and improved catalysts.

Funding will be provided for areas of research in carbon cycle management including appropriate areas that will be jointly identified and implemented by the BER and BES programs. Solicitations will be issued for individual research projects. Additionally, proposal notifications may be developed jointly with the DOE energy technology programs with the intention of establishing multi-disciplinary centers at universities and national laboratories that will use the full capabilities of the institutions for a research program in carbon cycle management encompassing, for example, topics in the following areas: integration and assessment; separations; efficiency; clean fuels; bioenergy; storage and conversion; sequestration; enhanced natural terrestrial cycles; and enhanced use of major scientific user facilities to support carbon management research.

Interagency Environment

The SC program in fundamental science supporting energy technologies will be closely coordinated with, and synergistic to, the activities in its sister agencies (e.g., NASA, NSF, NOAA, USDA, DOI, and EPA) within the US/GCRP. Through its leadership role in decade to century climate prediction, BER has developed the research capability for comprehensive and large scale modeling of carbon dioxide impacts on climate, ecology, and ocean sciences, and this expertise is augmented by complementary activities in the other agencies. Similarly, the network of carbon flux measurements and ecological experiments that BER has developed serve as a backdrop to those of many other agencies, and the state-of-the-art can thus be pushed ahead more rapidly by capitalizing on the more rapidly growing base of knowledge. BER also has a leadership role within the US/GCRP on consequence evaluation of increased greenhouse gases in global climate change, including integrated assessments that address both scientific and societal (including economic) impacts of carbon management. Finally, through its pre-eminent role in the Human Genome Program and its development of the complementary Microbial Genome Program, the BER program is ideally placed to support research that will focus on the application of genetic information of microorganisms to increase metabolic efficiency related to carbon dioxide and methane production or consumption.

BER Activities

Climate Change Technology Initiative

(dollars in thousands)

	FY 1999	FY 2000
Life Sciences	2,434	5,841
Environmental Processes	2,921	6,815
Total	5,355	12,656

The BER program has the opportunity to take advantage of the unique research capabilities within the Environmental Processes subprogram and to determine which natural systems of forest, other plant, and marine microorganisms can be induced to increase their natural carbon sequestration capabilities. This will help to position the Department and the Nation to build new energy efficient technologies that capitalize on Nature's own processes. Additionally, through its pre-eminent role in the Human Genome Program and its development of the complementary Microbial Genome Program within the Life Sciences subprogram, the BER program is ideally placed to support research that will focus on the production of genetic information on methane-producing and hydrogen-producing microorganisms that can be exploited in the development of useful and efficient non-fossil fuel sources. Where appropriate, these efforts will be coordinated with activities within the US/GCRP. When combined with complementary activities within the BES program, this initiative will lead to the comprehensive carbon management research program described, above.

Funding of Contractor Security Clearances

In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances that are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $101,000 and $90,000 for estimated contractor security clearances in FY 1999 and FY 2000, respectively, within this decision unit.

Scientific Simulation Initiative

This budget also includes the BER program's contribution to DOE's Scientific Simulation Initiative (SSI), an integrated effort bringing together computational and communication resources, focused research in scientific disciplines, and research in computer science and other enabling technologies to solve the complex problems that characterize DOE's scientific research needs. The SSI couples research in advanced scientific applications in the programs of the Office of Science with research in computer science and enabling technologies and advanced computing and communications facilities. It is a joint program between the Computational and Technology Research (CTR) program and the other programs in SC. The overview of the integrated program is given in the overview of the CTR budget; however, the specific contributions of the BER program are described below.

BER, which has been for many years the primary supporter of research in global systems in the DOE, will manage the global systems applications research effort. These efforts are the result of a successful interagency program to study global systems as a part of the U.S. Global Change Research Program (USGCRP), in which the Department plays a major role. These efforts will also contribute to the broader Presidential initiative in information technology. The goal of this effort is to dramatically advance the development, testing and use of fully coupled global system models with sufficient resolution to encompass the complete range of interactions from global to regional spatial scales over time periods of

tens to hundreds of years. Currently, too coarse spatial resolution, inadequate representation of key processes, such as cloud effects, and an inadequate number of short-duration model runs limit simulations and predictions of the global system. The computational and informational technology developed in the global systems research effort will be used to create a bridge that enables fully collaborative research between multi-institutional teams of computational scientists, global modelers and experts in the acquisition and interpretation of observational measurements. High fidelity component models, such as general circulation simulation codes of the atmosphere and ocean will be developed and tested first, then coupled for full system simulation. The data from these simulations as well as the individual component models themselves will be employed for more disciplinary-focused research related to environmental variability and change.

In addition, the simulation products of these models will provide a valuable and unique database for the study and understanding of long-term environmental variability and change. In order to make the best possible use of this data, the global systems component will develop and employ advanced collaborative and data management technology to enable the broad and diverse base of researchers and users from the many areas of environmental and earth science to advance the knowledge in their fields with the unprecedented volume and quality of the new information about the workings of the global environment.

To accomplish its goals the Global Systems applications research effort must: (1) accelerate progress in coupled general circulation model development and application; (2) reduce substantially the uncertainties in decade-to-century model-based projections of global environmental change; and (3) increase the availability and usability of global change projections to the broader environmental research and environmental assessment communities.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Biological and Environmental Research					
Life Sciences	163,792	179,492	-3,177	176,315	163,664
Environmental Processes	105,780	120,262	-3,397	116,865	133,838
Environmental Remediation	64,497	67,435	-93	67,342	65,757
Medical Applications and Measurement Science	61,607	76,411	-245	76,166	47,911
Subtotal, Biological and Environmental	395,676	443,600	-6,912	436,688	411,170
Construction	0	0	0	0	0
Subtotal, Biological and Environmental	395,676	443,600	-6,912	436,688	411,170
Use of Prior Year Balances	-4,580 [a]	-3,798 [a]	0	-3,798 [a]	0
General Reduction for Policy Papers for CCTI	0	-5,500	5,500	0	0
General Reduction	0	-1,412	1,412	0	0
Total, Biological and Environmental Research	391,096 [b]	432,890	0	432,890	411,170

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Excludes $9,614,000 which was transferred to the SBIR program and $577,000 which was transferred to the STTR program.

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	19,661	20,651	18,251	-2,400	-11.6%
National Renewable Energy Laboratory	250	0	0	0	NA
Sandia National Laboratories	3,486	3,239	2,903	-336	-10.4%
Total, Albuquerque Operations Office	23,397	23,890	21,154	-2,736	-11.5%
Chicago Operations Office					
Ames Laboratory	766	631	500	-131	-20.8%
Argonne National Laboratory, East	11,278	9,181	8,487	-694	-7.6%
Brookhaven National Laboratory	26,501	22,142	19,228	-2,914	-13.2%
Total, Chicago Operations Office	38,545	31,954	28,215	-3,739	-11.7%
Idaho Operations Office					
Idaho National Environmental & Engineering Laboratory	2,158	2,034	1,736	-298	-14.7%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	34,358	31,587	29,003	-2,584	-8.2%
Lawrence Livermore National Laboratory	30,004	36,148	28,446	-7,702	-21.3%
Stanford Linear Accelerator Center (SSRL)	3,323	2,450	2,550	+100	+4.1%
Total, Oakland Operations Office	67,685	70,185	59,999	-10,186	-14.5%
Oak Ridge Operations Office					
Oak Ridge Inst. For Science & Education.	5,575	2,673	4,046	+1,373	+51.4%
Oak Ridge National Laboratory	25,422	21,617	19,153	-2,464	-11.4%
Total, Oak Ridge Operations Office	30,997	24,290	23,199	-1,091	-4.5%
Richland Operations Office					
Pacific Northwest National Laboratory	77,466	73,913	70,434	-3,479	-4.7%
All Other Sites [a]	155,428	210,422	206,433	-3,989	-1.9%
Subtotal, Biological and Environmental Research	395,676	436,688	411,170	-25,518	-5.8%
Use of Prior Year Balances	-4,580	-3,798 [b]	0	+3,798	+100.0%
Total, Biological and Environmental Research	391,096 [c]	432,890	411,170	-21,720	-5.0%

[a] Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

[b] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[c] Excludes $9,614,000 which was transferred to the SBIR program and $577,000 which was transferred to the STTR program.

Site Description

Ames Laboratory

Ames Laboratory is a Multiprogram Laboratory located on 10 acres in Ames, Iowa. At Ames, BER supports research into new biological imaging techniques such as fluorescence spectroscopy to study environmental carcinogens.

Argonne National Laboratory

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. At ANL, BER supports the operation of the Structural Biology Center, a high-throughput national user facility for protein crystallography at the Advanced Photon Source, and research in protein structure relating to the process of photosynthesis. In support of Global Change research, ANL coordinates the operation and development of the Southern Great Plains ARM site. The principal scientist for the Atmospheric Chemistry program is at ANL, providing broad scientific integration to the program.

Research is conducted to understand the molecular control of genes and gene pathways in both microbes and mammalian cells and molecular factors that control cell responses to low doses of radiation.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. BER supports the operation of beam lines for protein crystallography at the National Synchrotron Light Source and High Flux Beam Reactor for use by the national biological research community, research in biological structural determination, research and operation of the protein structure database, and research into new instrumentation for detecting x-rays and neutrons. Technology development research is conducted to improve current methods for high throughput DNA sequencing. Research is also conducted on the molecular mechanisms of cell responses to low doses of radiation and chemicals.

The Boron Neutron Capture Therapy (BNCT) program supports early clinical trials of this concept for treatment of brain cancers that do not respond to conventional treatment. The nuclear medicine program supports research into novel techniques for imaging brain function in normal and diseased states and funds the operation of the Brookhaven Imaging Center as a user facility for research in many branches of medicine.

Global change activities at BNL include the operation of the ARM External Data Center, a resource that provides ARM investigators with data from non-ARM sources, including satellite and ground-based systems. BNL scientists form an important part of the science team in the Atmospheric Sciences program, providing special expertise in atmospheric field campaigns and aerosol research. BNL scientists play a

leadership role in the development of, and experimentation at, the Free Air Carbon Dioxide Enhancement (FACE) at the Duke Forest.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory is a Multiprogram Laboratory located on 572,000 acres in Idaho Falls, Idaho. BER supports research into boron chemistry, radiation dosimetry, analytical chemistry of boron in tissues, and engineering of new systems for application of this treatment technique for brain and other tumors. Research into the analytical chemistry of complex environmental and biological systems using the technique of mass spectrometry is also supported.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory (LBNL) is a Multiprogram Laboratory located in Berkeley, California. The Laboratory is on a 200 acre site adjacent to the Berkeley campus of the University of California. LBNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high throughput human DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. A significant component of the JGI's sequencing goal is the development and integration of instrumentation, automation, biological resources, and data management and analysis tools into a state-of-the-art DNA sequencing assembly line that is highly efficient and cost effective. The laboratory also conducts research on the molecular mechanisms of cell responses to low doses of radiation and chemicals and on the use of model organisms to understand and characterize the human genome.

LBNL operates beam lines for determination of protein structure at the Advanced Light Source for use by the national biological research community, research into new detectors for x-rays, and research into the structure of membrane and other proteins.

Research is conducted into the use of accelerators to produce neutrons for boron neutron capture therapy, an alternative treatment for highly malignant brain tumors. The nuclear medicine program supports research into novel radiopharmaceuticals for medical research and studies of novel instrumentation for imaging of living systems for medical diagnosis.

LBNL supports the Natural and Accelerated Bioremediation Research (NABIR) program and the field geophysical - biophysical research capabilities for NABIR field sites. BER supports research into new technologies for characterization of complex environmental contamination. LBNL also develops scalable implementation technologies that will allow widely used climate models to run effectively and efficiently on massively parallel processing supercomputers.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a Multiprogram Laboratory located on a 821 acre site in Livermore, California. LLNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high throughput human DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. A significant component of the JGI's sequencing goal, is the development and integration of instrumentation, automation, biological resources, and data management and analysis tools into a state-of-the-art DNA sequencing assembly line that is highly efficient and cost effective. LLNL also conducts research on the molecular mechanisms of cell responses to low doses of radiation and chemicals, on the use of model organisms to understand and characterize the human genome, and on the development of new technologies for determining the structures of many more proteins than is currently possible.

Through the Program for Climate Model Diagnostics and Intercomparison, LLNL provides the international leadership to understand and improve climate models.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a Multiprogram Laboratory located on a 27,000 acre site in Los Alamos, New Mexico. LANL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high throughput human DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. A significant component of the JGI's sequencing goal is the development and integration of instrumentation, automation, biological resources, and data management and analysis tools into a state-of-the-art DNA sequencing assembly line that is highly efficient and cost effective. LANL also conducts research on the molecular mechanisms of cell responses to low doses of radiation and to understand the molecular control of genes and gene pathways in microbes.

Activities in structural biology include the operation of an experimental station for protein crystallography at the Los Alamos Neutron Science Center for use by the national biological research community and research into new techniques for determination of the structure of proteins.

LANL coordinates the operation and development of the Tropical Western Pacific ARM site. LANL also has a crucial role in the development, optimization, and validation of coupled atmospheric and oceanic general circulation models on massively parallel computers.

LANL also conducts research into advanced medical imaging technologies for studying brain function and research into new techniques for rapid characterization and sorting of mixtures of cells and cell fragments.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE) is located on a 150 acre site in Oak Ridge, Tennessee. ORISE coordinates several research fellowship programs for BER including minority faculty and student research fellowships, Hollaendar postdoctoral fellowships, and humanitarian research awards

to scientists in the Former Soviet Union. ORISE also coordinates activities associated with the peer review of all BER-funded science.

ORISE conducts research into modeling radiation dosages for novel clinical diagnostic and therapeutic procedures.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. ORNL has a leadership role in research focused on the ecological aspects of global environmental change. The Throughput Displacement Experiment at the Walker Branch Watershed is a unique resource for long term ecological experiments. ORNL is the home of the newest FACE experiment supported by BER. ORNL is the home to the ARM archive, providing data to ARM scientists and to the general scientific community. ORNL scientists provide improvement in formulations and numerical methods necessary to improve climate models. ORNL is also home to the Carbon Dioxide Information and Analysis Center, an international resource for providing quality assured environmental data. ORNL scientists make important contributions to the NABIR program, providing special leadership in microbiology applied in the field.

ORNL conducts research on widely used data analysis tools and information resources that can be automated to provide information on the biological function of newly discovered genes identified in high throughput DNA sequencing projects. The laboratory also conducts research on the use of model organisms to understand and characterize the human genome and on the molecular mechanisms of cell responses to low doses of radiation and chemicals.

ORNL conducts research into the application of radioactively labeled monoclonal antibodies in medical diagnosis and therapy, particularly of cancer, as well as research into new instrumentation for the analytical chemistry of complex environmental contamination using new types of biosensors.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL) is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. PNNL is home to the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL). PNNL and EMSL scientists play important roles in both supporting the NABIR program and in performing NABIR research.

PNNL operates the unique ultrahigh field mass spectrometry and nuclear magnetic resonance spectrometry instruments at the Environmental Molecular Sciences Laboratory for use by the national biological research community.

PNNL provides the lead scientist for the Environmental Meteorology Program, the G-1 research aircraft, and expertise in field campaigns. PNNL provides the planning and interface for the Climate Change Prediction Program with other climate modeling programs. The ARM program office is located at PNNL, as is the ARM chief scientist and the project manager for the ARM data system; this provides invaluable logistical, technical, and scientific expertise for the program. PNNL is developing the Second Generation Model for predicting the benefits and costs of policy actions with respect to global climate change.

PNNL conducts research into new instrumentation for microscopic imaging of biological systems and for characterization of complex radioactive contaminants by highly automated instruments.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a Multiprogram Laboratory, with a total of 3,700 acres, located in Albuquerque, New Mexico, with sites in Livermore, California, and Tonapah, Nevada. SNL coordinates the operation and development of the North Slope of Alaska ARM site. The chief scientist for the ARM-UAV program is at SNL, and SNL takes the lead role in coordinating and executing ARM-UAV missions.

To support environmental cleanup, SNL conducts research into novel sensors for analytical chemistry of contaminated environments.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center (SLAC) is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. It is the home of the Stanford Synchroton Radiation Laboratory (SSRL) and peer-reviewed research projects associated with SSRL. The Stanford Synchrotron Radiation Laboratory was built in 1974 to take the intense x-ray beams from the SPEAR storage ring that was built for particle physics by the SLAC laboratory. Over the years, the SSRL grew to be one of the main innovators in the production and use of synchrotron radiation with the development of wigglers and undulators that form the basis of all third generation synchrotron sources. The facility is now comprised of 25 experimental stations and is used each year by over 700 researchers from industry, government laboratories and universities. Through Stanford Linear Accelerator Center, BER (in coordination with the National Institutes of Health) is funding the operation of Stanford Synchrotron Radiation Laboratory beam lines for structural biology. This program involves synchrotron radiation-based research and technology developments in structural molecular biology that focus on protein crystallography, x-ray small angle scattering diffraction, and x-ray absorption spectroscopy for determining the structures of complex proteins of many biological consequences.

All Other Sites

The BER program funds research at 70 colleges/universities located in 35 states. This line also includes funding of research awaiting distribution pending completion of peer review results.

BER supports a broad range of peer-reviewed research at America's universities, including institutions that traditionally serve minority communities. Research opportunities are announced through public solicitations in the Federal Register for research applications from universities and the private sector.

Life Sciences research is conducted at a large number of universities in all aspects of the program. Research is conducted in support of high throughput human DNA sequencing at the JGI, on the sequencing of entire microbial genomes with value to the DOE mission, to understand the molecular control of genes and gene pathways in microbes, on the use of model organisms to understand and

characterize the human genome, and on the molecular mechanisms of cell responses to low doses of radiation and chemicals.

In structural biology, universities provide new imaging detectors for x-rays, research in computational structural biology directed at the understanding of protein folding, and research into new techniques such as x-ray microscopy.

Peer reviewed projects are supported in each element of the Environmental Processes subprogram, with very active science teams, in particular, in the Atmospheric Chemistry Program and the ARM programs. Academic investigators are essential to the Integrated Assessment portfolio. Through the National Institute for Global Environmental Change, academic scientists play essential roles in the establishment and maintenance of, and research at, the AmeriFlux sites.

NABIR research grants are awarded following the peer review of applications received in response to solicitations published in the federal register. Academic and private sector investigators are performing research in areas that include mechanistic studies of bioremediation of actinide and transition metal contamination, the structure of microbial communities in the presence of uranium and other such contaminants, gene function in microorganisms with degradative properties, geochemical and enzymatic processes in microbial reduction of metals, and the use of tracers to monitor and predict metabolic degradative activity.

In nuclear medicine, universities conduct research into new types of radiopharmaceuticals, particularly those based on application of concepts from genomics and structural biology. Emphasis is placed on radiopharmaceuticals that will be of use in advanced imaging techniques such as positron emission tomography. Research is supported into new instrumentation for medical imaging. Five centers of excellence for application of lasers in medicine are funded at medical schools by this program. The Boron Neutron Capture Therapy program supports studies of novel boron compounds for use in treating brain cancer, early clinical trials of the technique, and new instrumentation based on accelerators that could be used in hospitals and clinics. The Measurement Science program supports research into novel types of biosensors for application in analytical chemistry of contaminated environments.

Life Sciences

Mission Supporting Goals and Objectives

Research is focused on utilizing unique DOE resources and facilities to develop fundamental biological information and advanced technologies for understanding and mitigating the potential health effects of energy development, energy use, and waste cleanup. Research is conducted in five areas: structural biology, cellular biology, molecular biology, human genome, and health effects. The research:

- Integrates information and technologies from genome, structural biology, and molecular biology research with human health research to understand the complex relationships between genes, the proteins they encode, and the biological functions of these proteins in the context of the whole organism.
- Develops new biotechnologies, including those derived from microbial genome research, for bioremediation applications, and for the mitigation of potential health effects resulting from energy development, energy use, and waste cleanup.
- Supports DOE research at national user facilities for scientists to determine the molecular structure of enzymes, antibodies, and other important biological molecules. Computational structural biology research combines computer science, structural biology, and genome research to predict the functions of biological molecules. This information will enable the design or more efficient use of biological molecules for drugs, environmental cleanup, or energy-production and use.
- Develops and applies new technologies and resources to map and determine the sequence of the subunits of DNA found in a typical human cell, for analyzing and interpreting DNA sequence data, and for studying the ethical, legal, and social implications (ELSI) of information and data resulting from the genome program, especially issues of privacy, intellectual property, and education. Program emphasis is on high throughput, production sequencing of human DNA, rapid entry of data into public databases, and identifying the functions for a portion of the 100,000 genes that make up the human genome.
- Develops new molecular-based tools for health surveillance, biological dosimetry, and individual susceptibility determination to understand and characterize the risks to human health from exposures to low levels of radiation and chemicals both at home and at work. An emphasis is placed on research that utilizes the unique resources and tools developed in the Department's human genome, structural biology, and cellular and molecular biology programs.

Climate Change Technology Initiative

The Life Sciences subprogram's support of microbial genome research also underpins the climate change technology initiative. Knowing the genomic sequence of microbes that produce methane and hydrogen, will enable the identification of the key genetic and protein components of the organisms that regulate these gases. Understanding more fully how the enzymes and organisms operate, we will be able to evaluate their potential use to produce methane or hydrogen from either fossil fuels or other carbonaceous sources, including biomass or even some waste products. Recently discovered "extremophile" organisms could be used to engineer biological entities that could ingest a feedstock like methane, sequester the carbon dioxide, and give off hydrogen.

Performance Measures

- Determine the molecular structures of proteins with more than 60 percent of the new structures that are published in the peer reviewed literature resulting from data generated at synchrotron user stations by BER structural biology program.
- Complete the sequencing of 50 million finished and 70 million draft subunits of human DNA to submit to publicly accessible databases in FY 2000.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Structural Biology	29,962	27,086	28,145	+1,059	+3.9%
Molecular and Cellular Biology	30,402	36,140	23,380	-12,760	-35.3%
Human Genome	85,226	88,786	90,270	+1,484	+1.7%
Health Effects	18,202	19,975	17,854	-2,121	-10.6%
SBIR/STTR	0	4,328	4,015	-313	-7.2%
Total, Life Sciences	163,792	176,315	163,664	-12,651	-7.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Structural Biology			
■ Infrastructure support and development for the Nation's structural biologists. Development and operation of experimental stations at DOE national user facilities such as the synchrotrons and neutron beam sources. Completion of development and initial operation of the protein crystallography station at the Los Alamos Neutron Science Center. Support for the major three-dimensional structural database for proteins.	17,003	16,000	16,000
■ Basic research in structural biology including instrumentation research and research that cuts across basic biology, molecular biology, and computational biology. Completion of initial studies of inverse protein folding to understand the rules proteins follow to acquire the three dimensional structure that gives them their biological function. First prototypes of pixel array detectors for x-rays will be ready for field testing that will greatly increase the sensitivity and speed data collection needed for determining the structure and, ultimately, the function of proteins. Implementation of proteome research program to understand the structure, function, and interactions of all proteins encoded by an organism's genome.	12,959	11,086	12,145
Total, Structural Biology	29,962	27,086	28,145
Molecular and Cellular Biology			
■ The field of microbial genomics is one of the most exciting and high profile fields in biology today. Initiated by DOE in 1994, microbial genomics and microbial genomic sequencing were identified by *Science* magazine as one of the top 10 fields of discovery in both 1997 and 1998. The BER Microbial Genome Program has supported the complete genomic sequencing of 6 of the 18 bacteria whose DNA has			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
been sequenced and published. At least 12 more are in progress. The broad impacts of this research emphasize a central principle of the BER genome programs - complete genomic sequences yield answers to fundamental questions in biology. Microbes are being sequenced and characterized in several parts of the BER program because of potential impacts across several DOE missions. These include the Climate Change Technology Initiative (sequencing methane or hydrogen producing microbes or microbes involved in carbon dioxide sequestration), environmental cleanup (microbes for bioremediation), alternative fuel sources (methane production or energy from biomass), industrial processes (industrial useful enzymes), and biological nonproliferation (understanding and detecting biowarfare agents). The microbial genome program continues to capitalize on DNA sequencing technology from the human genome program to determine the complete DNA sequence of microbes with potential environmental, energy, or commercial applications. While the program continues its emphasis on DNA sequencing it has expanded to include research in three additional areas: (1) microbial diversity, to identify a broader array of potentially useful microbes; (2) new strategies for determining the DNA sequence of microbes for which the complete sequence of a very closely related microbe is already known, to avoid the need for costly and time consuming sequencing of many important microbes from scratch; and (3) novel strategies and tools for characterizing, manipulating, and modeling entire reaction pathways or regulatory networks of microbes or groups of microbes to maximize the usefulness of these newly characterized microbes.	5,200	7,000	8,860

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The Climate Change Technology Initiative (CCTI) continues to determine the DNA sequence of microbes that produce methane or hydrogen from carbonaeous sources or that could be used to sequester carbon dioxide. New research is being initiated to characterize key reaction pathways or regulatory networks in these microbes following the determination of their DNA sequence. These new studies focus on the development of practical uses for microbes within the CCTI.	0	2,434	5,841
■ Funding was provided for the Northeast Regional Cancer Institute in Scranton, Pennsylvania per Congressional direction for FY 1998 and for the Institute for Molecular Biology and Medicine, University of Scranton, Scranton, Pennsylvania, per Congressional direction for FY 1999.	9,735	10,189	0
■ Molecular biology research, as a general research area, comes to an end with the exception of continued funding for the Human Science Frontiers Program, an international program of collaborative research to understand brain function and biological function at the molecular level supported by U.S. government through the DOE, the National Institutes of Health, the National Science Foundation, and the National Aeronautics and Space Administration.	6,735	4,684	1,000
■ The low dose exposure program uses molecular level knowledge gained from the Department's human genome and structural biology research to ascertain the effects on humans, ranging from cells to the whole organism, that arise from low-dose-rate exposures to energy and defense-related insults such as radiation and chemicals. This information will provide a better scientific basis for remediating contaminated DOE sites and achieving acceptable levels of human health protection, both for cleanup workers and the public, in a more cost-effective manner that could save billions of dollars.	3,000	8,000	7,679
■ Cellular biology research, as a general research area, comes to an end and is replaced by the low dose exposure program.	5,732	3,833	0
Total, Molecular and Cellular Biology	30,402	36,140	23,380

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Human Genome			
■ The Joint Genome Institute (JGI) and its Production Sequencing Facility (PSF) are primarily focused on high throughput sequencing of human DNA. The JGI is a virtual institute formed from the combined strengths and expertise of the DOE Human Genome Centers at the Los Alamos, Lawrence Livermore, and Lawrence Berkeley National Laboratories. FY 2000 is the third year of a major 3-5 year scale-up in DNA sequencing capacity for the PSF. In FY 2000 the PSF will complete the sequencing and submission to public databases of 50 million finished and 70 million high quality draft base pairs of human DNA.	46,300	50,000	53,894
■ Improvements in high throughput human DNA sequencing technology and sequence data management are needed to complete the first human genome by 2003 and to most efficiently and cost effectively use that new sequence information for future medical diagnoses and new scientific discovery. Research is conducted to continue the incremental improvements in current DNA sequencing technology by increasing throughput, increasing accuracy, and decreasing cost. New sequencing technologies, that have been investigated on a pilot scale, are tested and "hardened" in a DNA sequencing production environment. Research is conducted on the next generation of sequencing technology that will be needed to take advantage of the DNA sequence to be determined after 2003. Research on automated and robust approaches to analyze and manage the large amounts of DNA sequence being determined continues. These approaches will replace the hands-on, gene-by-gene analyses traditionally used by scientists to make their initial analyses of newly discovered or identified genes. A table follows displaying both DOE and NIH genome funding.	36,411	36,226	33,816

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ The Ethical Legal and Societal Issues (ELSI) program increases its emphasis on research related to the uses, impacts, and implications of genetic information in the workplace and the use of the workplace as a research environment.	2,515	2,560	2,560
Total, Human Genome	85,226	88,786	90,270

U.S. Human Genome Project Funding

(dollars in millions)

	Prior Years	FY 1998	FY 1999	FY 2000
DOE Total Funding (includes construction)	457.3	85.2	88.8	90.3
NIH Funding	1,234.4	218.0	240.1	TBD
Total U.S. Funding	1,691.7	303.2	328.9	TBD

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Health Effects			
■ The low dose exposure program, also funded under Cellular Biology, uses molecular level knowledge gained from the Department's human genome and structural biology research to ascertain the effects on humans, ranging from cells to the whole organism, that arise from low-dose-rate exposures to energy and defense-related insults such as radiation and chemicals. This information will provide a better scientific basis for remediating contaminated DOE sites and achieving acceptable levels of human health protection, both for cleanup workers and the public, in a more cost-effective manner that could save billions of dollars.	0	0	2,321

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Model organism research capitalizes on our understanding and the manipulability of the genomes of organisms, including yeast, nematode, fruitfly, Zebra fish, and mouse, to speed understanding of human genome organization, regulation, and function. Research is conducted at a genomic or near-genomic scale, i.e., not, for example, at the level of individual genes, and focuses on understanding of human genome organization, regulation, and function. Funding to be provided to ORNL to continue conceptual design activities for the Center for Functional Genomics.	0	9,000	11,027
■ Technology development research results in new approaches, tools, or technologies for determining the structures of many more proteins than is currently possible and includes more efficient strategies for protein expression and more efficient, high-throughput methods of protein sample preparation for protein crystallization. Research to develop and use protein microarray systems for functional screening of large numbers of proteins is also conducted.	0	3,000	4,506
■ Biological research, as a general research area, comes to an end.	18,202	7,975	0
Total, Health Effects	18,202	19,975	17,854
SBIR/STTR			
■ In FY 1998, $3,872,000 and $233,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of these programs.	0	4,328	4,015
Total, Life Sciences	163,792	176,315	163,664

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Structural Biology	
■ Structural biology research increases as proteome research program is implemented	+1,059
Molecular and Cellular Biology	
■ Increase in Microbial Genome for new research on microbial diversity, gene networks, and strategies for DNA sequencing that capitalize on known DNA sequence.	+1,860
■ Increase in Climate Change Technology Initiative (CCTI).	+3,407
■ Decrease in Molecular Biology due to completion of traditional Molecular Biology research and development and expansion of new research programs and completion of Congressionally directed project.	-13,873
■ Continue low dose research at FY 1999 level	-321
■ Decrease in Cellular biology research due to completion of traditional Cellular Biology research and development and expansion of a new low dose research program in Cellular Biology	-3,833
Total, Molecular and Cellular Biology	-12,760
Human Genome	
■ Increase for Human Genome research due to increase in sequencing of human DNA to meet national program goals	+1,484
Health Effects	
■ Increase in low dose research due to continued expansion of new crosscutting program to understand the health impacts of low dose exposures to radiation and chemicals	+2,321
■ Increase in model organisms research due to increased emphasis on research to understand human genome organization, regulation, and function	+2,027

	FY 2000 vs. FY 1999 ($000)
■ Increase in technology development research due to increased emphasis on developing new methods for determining the structure and function of large numbers of proteins	+1,506
■ Decrease in Biological Research due to completion of traditional Biological Research program and development and expansion of new research programs.	-7,975
Total, Health Effects	-2,121
SBIR/STTR	
■ Decrease in SBIR/STTR due to reduction in research funding.	-313
Total Funding Change, Life Sciences	-12,651

Environmental Processes

Mission Supporting Goals and Objectives

Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. A major part of the research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming. The program is comprehensive with an emphasis on understanding the radiation balance from the surface of the Earth to the top of the atmosphere (including the role of clouds) and on enhancing the quantitative models necessary to predict possible climate change at the global and regional scales. The components of the Atmospheric Radiation Measurement (ARM) program continue to work in an integrated fashion to produce the experimental and modeling results that will be necessary to resolve the greatest uncertainty in climate prediction - the role of clouds and solar radiation. Climate modeling using massively-parallel supercomputers will simulate climate change, predict climate, and evaluate model uncertainties due to changes in atmospheric concentrations of greenhouses gases on decade to century time scales. The Carbon Cycle program is designed to study the natural carbon cycle and to assess the potential impacts of climate change on terrestrial systems. There are four contributing areas to this research program: Climate and Hydrology, Atmospheric Chemistry and Carbon Cycle, Ecological Processes, and Human Interactions. The National Institute for Global and Environmental Change (NIGEC) is included within these four areas. The Environmental Processes subprogram includes funding for DOE's contribution to the U.S. Global Change Research Program that was codified by Congress in the Global Change Research Act of 1990 and for part of the Energy Research activities under the Climate Change Technology Initiative.

Climate Change Technology Initiative

The Atmospheric Chemistry and Carbon Cycle category supports basic research that promotes an understanding of the role that the terrestrial biosphere and human activities play on the state and quality of the global climate. Complementing the activities in support of the U.S. Global Change Research Program, science for the Climate Change Technology Initiative seeks the understanding necessary to exploit the biosphere's natural processes for use in sequestration of atmospheric carbon dioxide including the roles of marine microorganisms in ocean carbon sequestration and the mechanisms by which forest ecosystems sequester carbon.

Scientific Simulation Initiative

Building on the long-standing BER expertise in climate modeling, the Scientific Simulation Initiative will create a bridge between computational scientists, global modelers, and experts in the acquisition and interpretation of observational measurements to develop, test, and use highly advance fully coupled global system models. The focus will be on models that are of much higher spacial resolution than currently available, and model runs will simulate climate over time periods of tens to hundreds of years, at fidelities that cannot be achieved with current hardware or software. In doing so, the SSI will bring

together expertise from academia and the federal laboratories, and couple activities in a synergistic way to bring global system modeling to a broader spectrum of environmental research than is currently possible.

Performance Measures

- Proceed on the development of the next generation coupled ocean-atmosphere climate model, leading to better information for assessing climate change and variability at regional, rather than global scales. This next generation model will change grid size from the current 300-500 kilometers on a side to less than 200 kilometers on a side.
- Coordinate with other federal agencies, Canada, and Brazil to maximize national and international capabilities to enhance understanding of the current global carbon dioxide distribution and the role of the terrestrial biosphere in that distribution.
- Develop collaborative partnerships between strong marine sciences research institutions and those with developing capabilities to advance innovative techniques in modern molecular biology to understand the coupling between carbon and nitrogen cycles in coastal waters and sediments.
- In cooperation with NASA, NSF, USDA/Forest Service, and the Smithsonian Institution, provide quantitative data on the annual exchange of carbon dioxide between the atmosphere and terrestrial ecosystem from 25 AmeriFlux sites representing major types of ecosystem and land uses in North Central America. Provide data on both the effects of environmental factors, such as climate variation, on the net sequestration or release of carbon dioxide and the role of biophysical processes controlling the net exchange.
- Commence full operation at three Atmospheric Radiation Measurement (ARM) sites, providing unique climatological data necessary to improve climate prediction for use in energy policy development. Continue ARM accomplishments by conducting five intensive operations periods at the ARM Southern Great Plains site. Data will be obtained from the second station on the North Slop of Alaska. The third station in the Tropical Western Pacific, on Christmas Island, will become operational.
- Continue The Global Change Research Education Program which will continue to support graduate and undergraduate students conducting DOE-related global change research. It will continue to participate in the multi-agency "Significant Opportunities in Atmospheric Research and Science" Program (SOARS).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Climate and Hydrology	63,150	64,093	74,383	+10,290	+16.1%
Atmospheric Chemistry and Carbon Cycle	20,675	29,972	32,924	+2,952	+9.8%
Ecological Processes	13,084	12,348	12,010	-338	-2.7%
Human Interaction	8,871	7,483	11,105	+3,622	+48.4%
SBIR/STTR	0	2,969	3,416	+447	+15.1%
Total, Environmental Processes	105,780	116,865	133,838	+16,973	+14.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Climate and Hydrology			
■ **Climate Modeling:** Improved simulations provide the scientific basis for predicting climate and its implications for future decades. Develop next generation coupled atmosphere-ocean general circulation models with improved resolution to approximately 200 km grid size. Additionally, develop improved climate observational databases for testing and verifying the models. Support will continue for needed computational resources on the supercomputers at the LANL Advanced Computing Laboratory.	20,469	21,336	20,274
■ **Scientific Simulation Initiative (SSI):** Regional Variability Associated with Global Changes: There is a need to analyze and downscale global climate model simulations to smaller scales for regional studies of environmental changes. Methodologies to do so will be developed and implemented using a hierarch of applied and engineering models. Technologies will be developed and employed that can quickly and efficiently work with large and distributed and archived sets of both observational and modeling data to produce data sets suitable for study of regional changes and their impacts. Two centers connected to the core SSP infrastructure will be established to access the primary data archive and computational facilities.	0	0	3,902

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Scientific Simulation Initiative (SSI):** Coupled Model Development, Testing and Application: With its partners in the multi-agency U.S. Global Change Research Program, DOE will establish two multi-institutional model development teams for research on fully coupled comprehensive models for simulating multi-decade and multi-century changes of the global environment at regional resolution. Included in these activities is implementation of collaboratory technology to facilitate interaction and speed progress.	0	0	2,930
■ **Scientific Simulation Initiative (SSI):** Component Model Research and Development: Initiate research to pursue improvements in predictability, numerical methods, and parameterizations needed for improving the fidelity and computational performance of the component models, such as atmospheric and ocean general circulation models, that integrate to form comprehensive, coupled climate models.	0	0	2,930
■ **Atmospheric Radiation Measurement (ARM):** The Atmospheric Radiation Measurement (ARM) infrastructure program develops, supports, and maintains the three ARM sites and associated instrumentation. Continue operation of over two hundred instruments at the Southern Great Plains site. Begin limited operations of the third Tropical Western Pacific station on Christmas Island. Redeploy ARM instruments used in the Surface Heat Budget of the Arctic Ocean (SHEBA) as the second North Slope of Alaska station. Provide data to scientific community through the ARM Archive.	28,017	28,224	27,371

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Atmospheric Radiation Measurement (ARM):** ARM research will support about 50 principal investigators working on cloud physics and on solar radiation interactions with water vapor and aerosols. Conduct the ARM-led, multi-agency and Japanese experimental campaign on Nauru (Tropical Western Pacific) to study the effects of islands in measuring solar radiation and cloud interactions with the oceans. Enhance interactions with prominent climate modeling centers, including those supported by the NSF and by NOAA. Additional field studies will focus on connection of ARM data with carbon cycle research	11,659	11,659	14,093
■ **Atmospheric Radiation Measurement (ARM)/Unmanned Aerial Vehicles (UAV):** The joint ARM-UAV and NASA field study of tropical cirrus clouds will provide new information on key cloud formations that moderate the radiation budget of the Earth.	3,005	2,874	2,883
Total, Climate and Hydrology	63,150	64,093	74,383
Atmospheric Chemistry and Carbon Cycle			
■ Atmospheric Science programs provide data that address the new air quality standards on tropospheric ozone and particulate matter. Conduct laboratory and field studies of the chemistry and reactivity of atmospheric species and transport. Support tropospheric ozone and aerosols studies, in conjunction with the North American Research Strategy for Tropospheric Ozone (NARSTO). Support air quality modeling and initiate pollution transport studies (and related aspects of weather forecasting). Complete the data analysis for the prototype megacity air quality study in Mexico City, Mexico. Partial support for the National Institute for Global Environmental Change (NIGEC) is included in this budget activity.	12,856	12,967	11,278

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Field studies of major ecosystem types and land uses provide data to better understand the effects of environmental factors such as climate variation on the net exchange of carbon and the role of biophysical processes controlling this exchange. Operate the AmeriFlux network of twenty-five instrumented research towers for measurements of long-term carbon dioxide and water vapor fluxes and energy exchange from a large variety of ecosystems. Using tools of microbiology explore linkages between carbon and nitrogen cycles in marine microbes by partnering institutions with traditional research in oceans and those with emerging capabilities.	7,819	13,113	14,831
■ Funding was provided for the Marine Mammal Research and Education Center at the National Energy Laboratory at Keahole Point, Hawaii, per Congressional direction in FY 1999.	0	971	0
■ Under the Climate Change Technology Initiative, improve understanding of biochemical mechanisms of natural carbon sequestration in both terrestrial and ocean systems in order to, ultimately, enhance or augment these natural processes. Conduct studies on the cellular processes that lead to sequestration in forest ecosystems and the identification of the pathways by which marine microorganisms enhance carbon flow from the atmosphere to ocean surface and, ultimately, to the deep ocean.	0	2,921	6,815
Total, Atmospheric Chemistry and Carbon Cycle	20,675	29,972	32,924
Ecological Processes			
■ Improve understanding and modeling of the effects of elevated carbon dioxide on whole ecosystem structure and function that effect the nation's resources. Investigate the relationship between precipitation and the regeneration and species composition of deciduous forests in Tennessee's Walker Branch Watershed. Analyze the effects of precipitation changes on nutrient cycling, carbon			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
sequestration, forest growth, and decomposition in a southeastern deciduous forest. Free Air Carbon Dioxide Enrichment (FACE) experiments at Duke Forest; the Nevada desert; Oak Ridge, TN; Cedar Creek, MN; and Rhinelander, WI, will provide data on the effects of elevated carbon dioxide and other environmental changes on forest, desert, and grassland ecosystems. Partial support for the NIGEC is included in this budget activity.	13,084	12,348	12,010

Human Interactions

- The Integrated Assessment program investigates the diffusion of technology innovation into societal use and develops expanded economic models to include consideration of five additional greenhouse gases (nitrous oxide, methane, CFC 11, HCFC 22, and CF4) other than carbon dioxide. The Information and Integration program stores, evaluates, and quality-assures a broad range of global environmental change data and disseminates these to the broad research community. Included is the Quality Systems Science Center for the tri-lateral (Mexico, United States, and Canada) NARSTO. The educational activities support DOE mission-related research into global environmental change by students at the undergraduate and graduate levels. Included in these activities are the Summer Undergraduate Research Experience, Graduate Research agency "Significant Opportunities in Atmospheric Research and Science" Program. Partial support for the National Institute for Global Environmental Change is included in this budget activity. BER will provide opportunities for pre-college teachers that will participate directly in cutting-edge research at DOE science laboratories and will renew their understanding of scientific investigation. Where teachers do not possess sufficient background to participate directly in research, DOE will provide mediated research experiences where teachers can work with teams of scientists and science educators to understand the nature of DOE's scientific research. The goal is to provide educators with the tools to sharpen their science and math foundations and apply these tools to their classroom practice. Funds

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
will be provided to pay for teacher's stipends, travel, housing, and subsidize laboratory scientists' time for this activity ($1,947,000).	8,871	7,483	11,105
SBIR/STTR			
■ In FY 1998, $2,625,000 and $154,000 were transferred to the SBIR and STTR programs, respectively. In FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of these programs.	0	2,969	3,416
Total, Environmental Processes	105,780	116,865	133,838

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Climate and Hydrology	
■ Represents transition of some high end computing developments to activities under the SSI.	-1,062
■ SSI. Initiate activities to develop methodologies and research collaborations to increase fidelity and resolution of global systems simulations..	+9,762
■ Reflects that the ARM research sites are at increased stages of development	-853
■ Increase to provide for data collection to enhance scientific understanding of coupling between clouds, radiation, and atmospheric part of carbon cycle	+2,434
■ ARM-UAV to continue at FY 1999 level of effort	+9
Total, Climate and Hydrology	+10,290
Atmospheric and Carbon Cycle	
■ Represents completion of prototype megacity air quality study in Mexico City, Mexico.	-1,689
■ Increase to provide for data collection to validate carbon cycle.	+1,718
■ Decrease due to completion of Congressionally directed project.	-971

	FY 2000 vs. FY 1999 ($000)
■ CCTI. Increased focus on ocean and terrestrial sequestration by natural ecosystems.	+3,894
Total, Atmospheric and Carbon Cycle	+2,952
Ecological Processes	
■ Ecological Processes continues at FY 1999 level.	-338
Human Interactions	
■ Increase will allow new activities coupling educational opportunities with research in environmental meteorology and will allow pre-college teachers to participate directly in cutting-edge research at DOE science laboratories.	+3,622
SBIR/STTR	
■ SBIR/STTR increase due to increase in research funding.	+447
Total Funding Change, Environmental Processes	+16,973

Environmental Remediation

Mission Supporting Goals and Objectives

The research is primarily focused on gaining a better understanding of the fundamental biological, chemical, geological, and physical processes that must be marshaled for the development and advancement of new, effective, and efficient processes for the remediation and restoration of the Nation's nuclear weapons production sites. Priorities of this research are bioremediation and operation of the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL). Bioremediation activities are centered on the Natural and Accelerated Bioremediation Research (NABIR) program, a basic research program focused on determining the conditions under which bioremediation will be a reliable, efficient, and cost-effective technique. This subprogram also includes basic research in support of pollution prevention, sustainable technology development and other fundamental research to address problems of environmental contamination. Facility operations supports the operation of the EMSL national user facility for basic research that will underpin safe and cost-effective environmental remediation methods and technologies and other environmental priorities.

Unique EMSL facilities such as the Molecular Science Computing Facility, the High-Field Mass Spectrometry Facility, and the High-Field Magnetic Resonance Facility will be used by the external scientific community and EMSL scientists to conduct a wide variety of molecular-level environmental science research, including improved understanding of chemical reactions in DOE's underground storage tanks, movement of contaminants in subsurface groundwater and vadose zone sediments, and atmospheric chemical reactions that contribute to global warming.

In the NABIR program, research advances will continue to be made from pore to field scales in the Biogeochemical Dynamics element; on genes and proteins used in bioremediation through the Biomolecular Science and Engineering element; in non-destructive, real-time measurement techniques in the Assessment element; in overcoming physico-chemical impediments to bacterial mobility in the Acceleration element; on species interaction and response of microbial ecology to contamination in the Community Dynamics and Microbial Ecology element; and in understanding microbial processes for altering the chemical state of metallic and radionuclide contaminants through the Biotransformation and Biodegradation element. In analogy with the Ethical, Legal, and Social Implications component of the Human Genome Program, the Bioremediation and Its Societal Implications and Concerns component of NABIR will explore societal issues surrounding bioremediation research and promote open and two-way communication with affected stakeholders, avoiding dictating solutions. Research in the Systems Integration, Prediction and Optimization element is being initiated to help define and develop an integrative model to aid collaboration and direction across research teams within the NABIR program.

Performance Measures

- Continue the Natural and Accelerated Bioremediation Research (NABIR) program to support fundamental research in environmental and molecular sciences that will underpin the development of bioremediation for containing hazardous waste and cleaning DOE sites. Site characterization of the first NABIR Field Research Center will proceed, and activities necessary to enable research sample distribution to investigators will commence.
- The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) will be identified and cited as an important resource in research publications and research proposals written by investigators in academia and at National Laboratories.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Bioremediation Research	28,781	28,895	28,039	-856	-3.0%
Clean Up Research	5,527	6,817	6,773	-44	-0.6%
Facility Operations	30,189	30,072	29,415	-657	-2.2%
SBIR/STTR	0	1,558	1,530	-28	-1.8%
Total, Environmental Remediation	64,497	67,342	65,757	-1,585	-2.4%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Bioremediation Research

- In NABIR, progress will be made in understanding both intrinsic bioremediation as well as manipulated, accelerated bioremediation using chemical/microbial amendments. Laboratory and field experiments will be in progress to understand the fundamental mechanisms underlying chemical processes, complexation/degradation, and microbial transport. Field site characterization of the first NABIR Field Research Center will proceed, in preparation for distribution of research samples to investigators. Three megabases of genomic DNA from microbes with potential utility in bioremediation will be sequenced. The interagency (DOE, National Science Foundation, Office of Naval Research,

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Environmental Protection Agency) program on environmental biotechnology will continue to be supported, completing the current awards, to advance understanding of the fundamental processes that control the bioavailability of complex chemical mixtures in field situations.	22,437	22,915	22,059
■ General Plant Projects (GPP) funding is for minor new construction, other capital alterations and additions, and for buildings and utility systems such as replacing piping in 30 to 40-year old buildings, modifying and replacing roofs, and HVAC upgrades and replacements. Funding of this type is essential for maintaining the productivity and usefulness of Department-owned facilities and in meeting its requirement for safe and reliable facilities operation. This subprogram includes landlord GPP funding for Pacific Northwest National Laboratory (PNNL) and for Oak Ridge Institute for Science and Education (ORISE). The total estimated cost of each GPP project will not exceed $5,000,000.	5,194	4,811	4,811
■ General Purpose Equipment (GPE) funding for general purpose equipment for PNNL and ORISE such as updated radiation detection monitors, information system computers and networks, and instrumentation that supports multi-purpose research.	1,150	1,169	1,169
Total, Bioremediation Research	28,781	28,895	28,039
Clean Up Research			
■ A program will be maintained to develop cost effective and efficient biotechnology and bioremediation methods and approaches for pollution prevention in key energy and pollution intensive industries. This includes additional research to characterize the geological, chemical, and physical properties that affect the rate and effectiveness of environmental remediation and waste-stream cleanup methods, including bioremediation.	5,527	6,817	6,773

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Facility Operations: William R. Wiley Environmental Molecular Sciences Laboratory (EMSL)			
■ EMSL became fully operational as a national user facility focusing on collaborative research, in FY 1998. Operating funds provide essential maintenance of instruments and associated support facilities, and the technical and Environmental, Safety and Health support needed by the wide-ranging user community to apply the EMSL scientific capabilities. EMSL will support about 600 users on an annual basis, with approximately half coming from academia to use such unique instrumentation as the 512- processor IBM SP computer system, the 750-MHZ and ultra high-field nuclear magnetic resonance spectrometers, the ultra-high vacuum scanning tunneling and atomic force microscopes, and the controlled atmosphere environmental chambers. . . .	27,057	28,083	27,426
■ Capital equipment support for the EMSL enables instrument modifications needed by collaborators and external users of the facility and helps to maintain the spectroscopic and computer equipment at state-of-the-art.	3,132	1,989	1,989
Total, Facility Operations	30,189	30,072	29,415
SBIR/STTR			
■ In FY 1998, $1,461,000 and $88,000 were transferred to the SBIR and STTR programs, respectively. In FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of these programs.	0	1,558	1,530
Total, Environmental Remediation	64,497	67,342	65,757

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Bioremediation Research	
■ Decrease in pollution prevention and sustainable development activities.	-856
Clean Up Research	
■ Decrease in pollution prevention and sustainable development activities.	-44
Facility Operations	
■ Decrease in Facility Operations will result in fewer hours of fully supported assistance for outside users working independently, rather than collaboratively, at the facility	-657
SBIR/STTR	
■ SBIR/STTR decrease due to reduction in research funding.	-28
Total Funding Change, Environmental Remediation	-1,585

Medical Applications and Measurement Science

Mission Supporting Goals and Objectives

The medical applications subprogram supports research to develop beneficial applications of nuclear and other energy-related technologies for medical diagnosis and treatment. The research is directed at discovering new applications of radiotracer agents for medical research as well as for clinical diagnosis and therapy. A major emphasis is placed on application of the latest concepts and developments in genomics, structural biology, computational biology, and instrumentation. Much of the research seeks breakthroughs in noninvasive imaging technologies such as positron emission tomography. The research in this activity is conducted in five specific areas: Radiopharmaceuticals, Instrumentation, Clinical Feasibility, Boron Neutron Capture Therapy (BNCT) and Molecular Nuclear Medicine.

The measurement science subprogram focuses on research in analytical chemistry to develop new instrumentation to meet the needs of the environmental and life sciences research programs of the Office of Biological and Environmental Research. Research is also supported that will meet needs for new instrumentation to characterize contaminated environments in support of the Department's environmental cleanup program.

Performance Measures

- Complete Phase I clinical trials of BNCT at reactor sources of neutrons for at least 100 patients.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Medical Applications	56,841	69,084	40,817	-28,267	-40.9%
Measurement Science	4,766	5,087	5,849	+762	+15.0%
SBIR/STTR	0	1,995	1,245	-750	-37.6%
Total, Medical Applications and Measurement Science	61,607	76,166	47,911	-28,255	-37.1%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Medical Applications			
■ Complete Phase I human clinical trials of boron neutron capture therapy (BNCT), for at least 100 patients, at Brookhaven National Laboratory, Massachusetts Institute of Technology and the Ohio State University, including trials to assess the maximum safe dosages of boron compound and neutron radiation. Capital equipment funds will be used to support research on an accelerator-based facility for BNCT as an alternative to the use of nuclear reactors.	11,648	11,441	10,892
■ Develop new approaches to radiopharmaceutical design and synthesis using concepts from genomics as well as computational biology and structural biology. Complete research into radiolabeling of monoclonal antibodies for cancer diagnosis and therapy, including research at the Garden State Cancer Center in the diagnosis of cancer and infectious diseases. Evaluate clinical potential of imaging of gene expression using radiotracers. Redirect program elements to emphasize development of techniques for the simultaneous use of multiple radiotracers to study physiological processes.	18,360	20,233	24,700
■ Develop new concepts in multimodal imaging systems for study of human brain function and complete evaluation of combination of nuclear medicine imaging systems with magnetic resonance imaging. Research into new applications of lasers in medicine emphasizes transfer of technology from the DOE laboratories to clinical research facilities. Capital equipment funds are provided in support of development of new instrumentation such as a PET camera for small animal imaging.	4,946	5,877	5,225
■ Complete phase-out of research into new radioisotopes for nuclear medicine applications.	36	0	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Funding for the Medical University of South Carolina, Loma Linda Medical Center, the University of California-Davis, the University of Rochester Medical Center, Englewood Hospital in New Jersey, the University of Nevada, Las Vegas, and New Mexico Highlands University as included in Congressional direction for FY 1998. Funding for these projects is completed in FY 1998.	21,851	0	0
■ Funding for Gallo Prostate Cancer Research and Treatment Center, City of Hope National Medical Center, National Foundation for Functional Brain Imaging, State University of New York - Stony Brook, University of California - Davis, University of Alabama, New Mexico Highlands University, West Virginia National Education and Technology Center and the University of South Carolina Medical Center, as included in Congressional direction for FY 1999. Funding for these projects is completed in FY 1999.	0	31,533	0
Total, Medical Applications	56,841	69,084	40,817
Measurement Science			
■ Complete research into new sensor instrumentation for characterization of chemical composition of contaminated subsurface environments in support of the Department's environmental cleanup efforts of highly radioactive chemical wastes. Continue research into new imaging instrumentation for environmental and life sciences applications. Capital equipment funds are provided for components needed for research into new instrumentation.	4,766	5,087	5,849
SBIR/STTR			
■ In FY 1998, $1,656,000 and $102,000 were transferred to the SBIR and STTR programs, respectively. In FY 1999 and FY 2000, amounts shown are the estimated requirement for the continuation of these programs.	0	1,995	1,245
Total, Medical Applications and Measurement Science	61,607	76,166	47,911

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Medical Applications	
■ BNCT—maintains program at FY 1999 level of effort.	-549
■ Increased funding for Radiopharmaceuticals allows for research efforts at the Garden State Cancer Center	+4,467
■ Decrease in instrumentation is attributable to complete development of imaging instrumentation	-652
■ Decrease due to completion of Congressionally directed projects.	-31,533
Total, Medical Applications.	-28,267
Measurement Science	
■ Increased funding for research in new sensor instrumentation for characterization of chemical composition of contaminated environments.	+762
SBIR/STTR	
■ SBIR/STTR decrease due to reduction in research funding.	-750
Total Funding Change, Medical Applications and Measurement Science	-28,255

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	5,194	4,811	4,811	0	0.0%
Capital Equipment	19,089	18,988	21,150	+2,162	+11.4%
Total Capital Operating Expenses	24,283	23,799	25,961	+2,162	+9.1%

Basic Energy Sciences

Program Mission

The MISSION of the Basic Energy Sciences (BES) program is to foster and support fundamental research in the natural sciences and engineering to provide a basis for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. As part of its mission, BES plans, constructs, and operates major scientific user facilities to serve researchers at universities, national laboratories, and industrial laboratories.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goals

- Maintain U.S. world leadership in areas of the natural sciences and engineering that are relevant to energy resources, production, conversion, and efficiency and to the mitigation of the adverse impacts of energy production and use;
- Foster and support the discovery, dissemination, and integration of the results of fundamental, innovative research in these areas;
- Provide world-class scientific user facilities for the Nation; and
- Act as a steward of human resources, essential scientific disciplines, institutions, and premier scientific user facilities.

Program Objectives

- *Obtain major new fundamental knowledge.* — Foster and support fundamental, innovative, peer-reviewed research to create new scientific and engineering knowledge in areas important to the BES mission, i.e., in materials sciences, chemical sciences, geosciences, plant and microbial biosciences, and engineering sciences.
- *Support the missions of the Department of Energy (DOE).* — Promote the transfer of the results of basic research to contribute to DOE missions in areas of energy efficiency, renewable energy resources, improved use of fossil fuels, reduced environmental impacts of energy production and use, science-based stockpile stewardship, and future energy sources.
- *Plan, construct, and operate premier national scientific user facilities* — for materials research and related disciplines to serve researchers at universities, national laboratories, and industrial laboratories, thus enabling the acquisition of new scientific knowledge. These scientific facilities include synchrotron radiation light sources, high-flux neutron sources,

electron-beam microcharacterization centers, and specialized facilities such as the Combustion Research Facility. In addition, to encourage and facilitate the use of these facilities in areas important to BES activities and also in areas that extend beyond the scope of BES activities, such as structural biology, environmental science, medical imaging, rational drug design, micromachining, and industrial technologies.

- *Establish and maintain stable, essential research communities, institutions, and scientific user facilities.* — Steward important research communities and institutions in order to respond quickly and appropriately to mission need and scientific opportunity. For example, BES serves as the Nation's primary or sole supporter of such important subdisciplines as heavy element chemistry, natural and artificial solar energy conversion, catalysis, organometallic chemistry, combustion related science, separations science, neutron science, radiation chemistry, and radiation effects in materials.

Performance Measures

BES is prototypical of a large, diverse, and robust basic research program that exists within a mission agency. BES measures performance in four areas that together characterize this special role. The first three areas relate to the fundamental tenets or principles of BES, which correspond directly to the goals described above. These tenets are: (1) excellence in basic research; (2) relevance to the comprehensive energy mission of the agency; and (3) stewardship of research performers, essential scientific disciplines, institutions, and scientific user facilities. Combining and sustaining these tenets are the management challenge of BES. The fourth area that BES measures performance in, therefore, is program management.

Activities in these four areas are measured in a number of ways, which separate naturally into four categories: (1) peer review; (2) indicators or metrics (i.e., things that can be counted); (3) customer evaluation and stakeholder input; and (4) qualitative assessments, which might include historical retrospectives and annual program highlights. A number of activities that might be considered essential or "foundation" performance measurement activities are already in place in BES; indeed, some have been ongoing for many years. Paramount among these is peer review of all research activities.

During FY 1998, BES instituted several changes in the way performance measurement is accomplished in order to better quantify performance. First, BES formalized the peer review process for activities at the DOE laboratories. Although research at the laboratories had long been peer reviewed, BES codified that process using a process analogous to that described in 10 CFR 605 for the university grant program. Second, BES established baselines for all performance indicators for each scientific user facility using a new survey tool. This survey tool, developed in FY 1997 in collaboration with the facility directors and the facility user coordinators, now is completed annually by all BES facilities. An integral part of the survey tool is an assessment of user satisfaction. The tool has generated considerable interest outside of BES and has been distributed to other organizations and non-BES facilities at their request. Third, BES began formal peer reviews of its major scientific user facilities. These reviews, the first of which was

documented in the 1997 Basic Energy Sciences Advisory Committee (BESAC) report on synchrotron radiation light sources ("Synchrotron Radiation Sources and Science" chaired by Professor Robert Birgeneau, MIT), assess in the aggregate, the scientific output and, to the extent possible, the outcomes of facilities. The High-Flux Isotope Reactor at Oak Ridge National Laboratory was reviewed in this manner in FY 1998. The four electron beam microcharacterization centers will be reviewed in FY 1999.

In FY 2000, (1) the development and upgrade of scientific user facilities, including the construction of the Spallation Neutron Source, will be kept on schedule and within cost, not to exceed 110 percent of estimates; (2) the operating time lost at scientific user facilities due to unscheduled downtime will be less than 10 percent of the total scheduled possible operating time, on average; (3) all research projects will undergo regular peer review and merit evaluation based on procedures set down in 10 CFR 605 for the extramural grant program and under a similar modified process for the laboratory programs and scientific user facilities; (4) new projects will be selected by peer review and merit evaluation; (5) work performed by investigators in universities and DOE laboratories will continue to be recognized as outstanding through the receipt of major prizes and awards; (6) continue Partnerships for Academic-Industrial Research where peer reviewed grants are awarded to university researchers for fundamental, high-risk work jointly defined by the academic and industrial research partners; and (7) continue fabrication of instrumentation for the short-pulse spallation source on the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center.

Performance measurement helps determine the distribution of activities supported within BES and the individual projects supported within each activity. The funding level for each activity is derived by weighing a number of additional factors including mission need as defined by the BES and SC mission statements; scientific opportunity as determined, in part, by proposal pressure and by scientific workshops; connections with other BES and SC supported work; connections with needs expressed by the DOE technology offices and by energy-intensive industries; program balance; and budgetary constraints.

Prizes, Awards, and Honors

Annually, principal investigators funded by BES win dozens of major prizes and awards sponsored by professional societies and by others; in addition, many are elected to fellowship in organizations such as the National Academy of Sciences, the National Academy of Engineering, and the major scientific professional societies. Paramount among the honors in FY 1998 was the Nobel Prize in Chemistry. The Nobel Prize in Chemistry for 1997 was awarded to three biochemists, Paul D. Boyer (University of California at Los Angeles), John E. Walker (Medical Research Council Laboratory of Molecular Biology of Cambridge, England) and Jens C. Skou (Aarhus University in Denmark). Drs. Boyer and Walker were cited for their elucidation of the enzymatic mechanism underlying the synthesis of adenosine triphosphate (ATP). Dr. Boyer's

work was supported in part by the BES Energy Biosciences subprogram and its predecessor organizations from 1963 until his retirement in 1993. This is the fourth Nobel Prize awarded to BES principal investigators in the past four years.

Other selected major prizes and awards for FY 1998 include:

From the American Ceramic Society — the Robert L. Coble Award; the Long-Term Service Award; the Sosman Memorial Lecture

From the American Chemical Society — the Analytical Chemistry Award in Electrochemistry; the Arthur C. Cope Scholar Award in Organic Chemistry; the Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry; the E. V. Murphree Award in Industrial and Engineering Chemistry; the Award in Chromatography; the Irving Langmuir Award in Chemical Physics; the Award in Spectrochemical Analysis; the Arthur K. Doolittle Award for Best Paper at the Polymeric Materials Science and Engineering Division meeting

From the American Institute of Aeronautics and Astronautics — the Award for Distinguished Service

From the American Institute of Chemical Engineers — the Professional Progress Award; the Research Achievement Award; the Thomas Chilton Award; the Warren K. Lewis Award

From the American Institute of Chemists — the Chemical Pioneer Award

From the American Physical Society — the David Adler Lectureship Award in the Field of Materials Physics; the Davisson-Germer Prize in Atomic or Surface Physics; the Earle K. Plyler Prize in Molecular Spectroscopy; the Frank Isakson Prize for Optical Effects in Solids; the Joseph F. Keithley Award for Advances in Measurement Science; the Julius Edgar Lilienfield Prize; the Centenial Speaker Award

From the American Society for Mass Spectroscopy — the Biemann Medal; the Distinguished Contribution Award

From the American Society of Plant Physiologists — the Stephen Hales Prize

From the American Welding Society — the Burton Medal; the Masubuchi Award; the Warren F. Savage Memorial Award

From the Electrochemical Society — the Olin Palladium Award Lecture

From the Eli Lilly Corporation — the Eli Lilly Award

From the Federal Planning Division of the American Planning Association — the Best 1998 Area Development Plan (Spallation Neutron Source, ORNL)

From the Geological Society of America — the Day Medal

From the IBM Corporation — the Supercomputer Award

From the Institute of Electrical and Electronic Engineers — the Prize Paper Award

From the Inter-American Photochemical Society — the Inter-American Society Award

From the International Association for Structural Safety and Reliability — the IASSAR Research Award

From the International Electron Paramagnetic Resonance/Electron Spin Resonance Society (IES) — the Silver Metal for Chemistry

From the International Organization on Multiphase Flow — the Multiphase Flow International Prize

From the International Society of Electrochemistry — the Prix Jacques Tacussel Award

From the Japan Society for the Promotion of Science — the International Prize for Biology

From the Japan Society of Multiphase Flow — the Lifetime Achievement Award

From the Materials Research Society — the von Hippel Award; the Graduate Student Award

From the Microbeam Analysis Society — the Heinrich Award

From the Microscopy Society of America — the Outstanding Technologist Award

From the Mineralogical Society of America — the Mineralogical Society of America Award

From the North American Catalysis Society — the Robert Burwell Lectureship Award; the International Catalysis Award

From R&D Magazine — R&D 100 Awards for TRUST- Terminal Repeller Unconstrained Subenergy Tunneling; SAMMS - Self-Assembled Monolayers or Mesoporous Supports; and MICLEAN/MICARE Solvent Cleaning Systems

From the Science Museum of Virginia and the State of Virginia General Assembly — the Virginia Outstanding Scientist

From the Semiconductor Research Corporation — the Aristotle Award

From the Serbian Chemical Society — the Centenary Medal

From the Society for Technical Communication — the Technical Communcation Award

From the Society of Applied Spectroscopy, New England Section — the Lester W. Strock Award

From the Wolf Foundation — the Wolf Foundation Prize in Chemistry

From Vice President Gore — the Hammer Award

Two principal investigators received the Presidential Young Investigator Award; five were inducted into the National Academy of Sciences; one was inducted into the National Academy of Engineering. Seven principal investigators were advanced to fellowship in the American Academy of Arts and Sciences; three in the American Association for the Advancement of Science; four in the American Ceramic Society; nine in the American Physical Society; two in the American Society for Metals; and one each into the following organizations: Geological Society

of America, Institute of Electrical and Electronic Engineers, the American Welding Society, National Science Foundation/Japanese Science Technology Agency, Optical Society of America, and the Royal Society of New Zealand.

Finally, principal investigators served in numerous elected offices including: President, American Chemical Society; President, International Society of Electrochemistry; President, Mineralogical Society of America; President-elect, American Ceramic Society; President-elect, American Society of Plant Physiologists; Vice President, American Physical Society; Chair, Division of Materials Physics, American Physical Society; and First Vice Chair, American Society for Testing and Materials.

Significant Accomplishments and Program Shifts

The BES program is one of the Nation's major sponsors of fundamental research in broad areas of materials sciences, chemical sciences, geosciences, biosciences, and engineering sciences. The program encompasses more than 2,400 researchers in 200 institutions and 17 of the Nation's premier user facilities. Presented below are program accomplishments from FY 1998. The selected program highlights are representative of the broad range of studies supported in the BES program. These highlights demonstrate the discovery of new knowledge, the rapidity with which such new knowledge can often be incorporated into other scientific desciplines and into the commercial sector, and the great potential of new knowledge for future impacts in energy production and use. Following that are discussions of scientific facilities and program initiatives.

Selected FY 1998 Scientific Highlights/Accomplishments

Materials Sciences

- *Helping to Solve the Mystery of High-Temperature Superconductivity.* Understanding high-temperature superconductivity, discovered in 1987, remains *the* outstanding problem in modern condensed matter physics. Recent neutron scattering experiments suggest that the electric current in high temperature superconductors may be like "stripes" of flowing current separated by stripes where current does not flow. These stripes can be static or dynamic (like the stripes on our flags, waving in the wind). These and other experiments point to a very different electron pairing mechanism than that seen in low-temperature superconductors. Once the pairing mechanism is understood, it will be easier to find materials with higher critical superconducting temperatures and better mechanical properties.
- *Magnetic Resonance Imaging (MRI) Without Magnets.* Striking, high resolution MRI images have been obtained without the need for high field magnets or high frequency detectors normally required for MRI. The breakthrough involves MRI enhancement by noble gases magnetically polarized (100,000 fold) through laser treatment. A new ultra-low-field MRI instrument now makes it possible to obtain extremely bright MRI pictures of polarized samples in the earth's natural magnetic field, which is thousands of times weaker than fields obtained from traditional MRI magnets (which are bulky, expensive, and often hazardous). The new instrument has been used with localized injection of polarized xenon solutions into

human blood to provide the first observations of the real-time process of xenon penetrating red blood cells. (Xenon is an inert gas and an FDA-approved anaesthetic.) This combination of techniques opens the way to provide high resolution MRI images of localized areas in animal and human subjects.

- *Discovery of New Materials Using LEGO.* Of the enormous number of combinations of elements in the periodic table, only a very small fraction are used in real materials. It is quite certain that materials with optimum properties for various applications have not yet been discovered. For example, high-temperature superconductivity occurs in ceramic compounds with a most unlikely combination of elements. A new strategy using fast computers and concepts from quantum mechanics has been developed to search for "winning combinations" of atoms to produce materials with improved physical properties. This approach -- Linear Expansion in Geometric Objects (LEGO) -- recognizes that even complex crystal structures can be viewed as a collection of simple geometric objects such as dumbbells, triangles, etc. By assigning each geometric object an energy value, computers can rapidly scan hundreds of thousands of candidates looking for the lowest overall energy and, therefore, the most stable structures. LEGO has already predicted several new intermetallic compounds missed through conventional approaches.
- *Electrically Conducting Nanoscale Ropes.* Incredibly light synthetic metals with a potential electrical conductivity 50-100 times better than copper per weight are being made from carbon nanotubes doped with metals. First discovered in 1991, nanotubes are a new class of materials formed from graphite-like sheets of carbon rolled into exquisitely small cylinders. They self organize in the vapor phase during growth to form well ordered crystalline bundles of individual nanotubes. The introduction of dopant atoms, such as potassium or lithium, into the open spaces between adjacent tubes within a rope can increase electrical conductivity significantly at room temperature. Doped nanotube ropes are also attracting increased interest as constituents of novel nanoscale device structures and as replacements for pure lithium metal in Li ion batteries.
- *Molecular Bricks for Nanotechnology.* Lightweight materials are commonly composed of polymers, which are long chains of atoms. The chains are difficult to order completely, which limits their functionality and durability. Researchers have recently demonstrated new possibilities for the design of polymers using nano-objects, which can be regarded as molecular bricks. These bricks, which might have shapes as diverse as those of nature's proteins, create a toolbox for the design of lightweight materials that could self assemble into structures with surprising functionality. Using the first elements of this toolbox, a spherical nanostructure has been created that has internally continuous channels; some channels transport water and ions, while others block water but accept organic substances. These nano-sponges could trap toxic metals from water streams.
- *What Makes Stainless Steel Stainless?* Corrosion damage is estimated to cost the U.S. 4.2 percent of the Gross National Product each year. Metals can be used in industrial and technological applications only when appropriately protected. In the case of stainless steel and many other metals, protection is provided by a thin oxide film that prevents further

corrosion. However, the structure of these oxide films has remained a mystery despite decades of study. Recent research using surface-sensitive synchrotron x-ray diffraction with a combination of electrochemical experiments has now unambiguously determined that the oxide film on pure iron has a very fine-grained, nanocrystalline structure. Results for iron-chromium alloys (e.g., stainless steel) have shown that the oxide films are also nanocrystalline. This overturns the long accepted belief that stainless steel is corrosion resistant because its oxide film is non-crystalline. These surprising results provide a more realistic basis for understanding corrosion resistance and for the development of better corrosion protection coatings.

- *Do Cracks "Melt" Their Way through Solids?* Predicting and explaining why, how, and when solids fracture is a significant scientific challenge. The driving force for fracture is intensification of the local stress at a crack tip, yet the mechanism by which local strain is dissipated during crack propagation is not well understood. Can strain energy be dissipated via "local melting" around the crack tip? Recent computer simulations of crack formation predict this intriguing possibility. Simulations indicated that the melting in front of a crack tip can lead to catastrophic fracture. Using high-voltage electron microscopy, observations of moving crack tips in an intermetallic compound confirmed the prediction of the computer simulations and showed the development of melted and rapidly re-solidified regions adjacent to the crack tip. This new picture of fracture as a stress-induced melting process may lead to new approaches to stress-corrosion cracking in the automotive, aerospace, power generation, and ship building industries.
- *Smart Filters.* New materials with tailored pore sizes and pore chemistry can selectively remove deadly heavy metals -- such as mercury, lead, and silver -- from water. Researchers discovered that precise control over the amount of water in the pores of porous silica enabled the insertion of useful organic molecules on the walls of the pores. Using this knowledge, monolayers of organic sulfur compounds were bound to the internal surfaces of porous silica to prepare selective filter materials. The high surface area of the porous silica (a few grams have as much surface area as a football field) coupled with the bonding characteristics of the organic compounds results in high filtering capacity and high selectivity for specific contaminants. In addition, pore openings in the silica are designed to be too small for microbes to enter and digest the contaminants, later causing human illness from, for example, mercury contamination. The filter materials can purify highly contaminated water in a single treatment to a level that exceeds drinking water standards. The filters can also be recovered and reused after removing the contaminants.
- *A Line in the Sand.* Granular materials like gravel, salt, or dry chemicals are ubiquitous in our daily lives and central to many industrial processes, yet controlling their motion is both surprisingly difficult and not well understood. For example, granular material subjected to a driving force remains at rest until a minimum "critical force" is applied; then it moves in uncontrollable events like avalanches. Inefficiency in handling granular materials may result in the loss of up to 40 percent of the design capacity of industrial plants. In its retrospective of the last 50 years, *Physics Today* highlighted the emerging science of granular materials as a

notable event of the last decade. Scientists have recently developed a theoretical approach to describe the motion of granular materials in a vibrating environment. This theory correctly describes the unexpected formation of stripe, square, and hexagon patterns on the surface of vibrated granular media and the formation of localized excitations called "oscillons." The theory also predicted how to control aspects of granular motion -- a prediction that was confirmed by experiment. The new theory brings the description and control of granular motion to a higher level of understanding and shows promise of substantial advances in basic granular science, which can lead to industrial applications that exploit the controlled motion of granular materials.

- *Vortex Matter -- A New Understanding of Magnetism in Superconductors.* Magnetic fields in superconductors are carried by "vortices." Each vortex consists of a tube of magnetic field surrounded by a circulating flow of electrons that move without resistance. It is this free flow of electrons that gives superconducting materials their special property. Recently, it has been shown that the system of magnetic vortices can take many forms analogous to the solid, liquid, and gaseous forms of ordinary matter. The analogy between the behavior of vortices and ordinary matter is so strong that a new term has entered the scientific vocabulary -- vortex matter. Vortex matter melts from a crystalline to a liquid state in much the same way that ice melts to water. The properties of vortex matter can be controlled over a wide range. For example, the density of vortices can be varied by a factor of 10,000 simply by changing the applied magnetic field. This remarkable control enables the study of many types of phenomena in vortex matter whose analogies in ordinary matter are difficult or impossible to observe. Thus, the identification and characterization of the melting transition in vortex matter has significant implications for phase transitions in ordinary matter, for understanding the electromagnetic properties of superconductors, and for developing applications of superconductivity.

Chemical Sciences

- *Landmark Experiment Challenges Combustion Models.* Combustion is perhaps the oldest technology in human experience, yet its complexity limits predictions of combustion processes in devices ranging from simple laboratory burners to automobile engines. The challenge is characterizing the influence of chemistry and fluid dynamics on one another. A simple experiment recently has demonstrated a major error in current models for combustion processes. The experiment allows the interaction of chemistry and turbulence to be examined in quantitative detail for the first time. A planar flame sheet is deformed by a puff of air generated by a small loudspeaker. Spectroscopic techniques are used to determine the concentrations of reaction intermediates as the flame sheet deforms. Comparisons of these experiments with computational simulations showed that the widely accepted chemical reaction mechanism for simple methane combustion is in error, thus, requiring a fundamental change in our models for combustion.
- *Fishing for Radioactive Actinides with Molecular Hooks.* The selection, separation, and removal of radioactive actinide ions from complex aqueous waste stream mixtures remain vexing technical issues. The development of new, improved separation approaches will result

in significant cost savings for nuclear waste treatments as well as improve environmental safety and materials safeguard security. A new family of chelate agents or "chemical fish hooks" suitable for the reversible "catch and release" of trivalent actinide ions in highly acidic solutions has been designed, prepared, and characterized. The latest chelate derivatives show separation characteristics that are especially suited to practical, batch type waste treatments.

- *First Isolation of a Catalytic Oxidation Intermediate.* Despite worldwide efforts over the last 15 years on catalytic olefin oxidation, little progress has been made in extrapolating from ethylene (the smallest olefin) to larger olefins such as propylene. The key question -- the molecular mechanism of ethylene epoxidation (which gives us anti-freeze and polyester fibers) -- remains unresolved. Now, a combined experimental and theoretical tour de force has yielded the first definitive isolation and spectroscopic characterization of a stable intermediate in the catalytic process -- an oxametallacycle. Calculations were employed to determine the structure for the oxametallacycle on silver and to predict the infrared spectrum and molecular motions for that structure. Conclusive identification was provided by the excellent agreement between the predicted infrared spectrum and the experimental electron energy loss spectrum.
- *Liquid Crystalline Organic Semiconductors Discovered.* Liquid crystals change their optical properties as they transition between distinctive geometric states. Digital watch displays, for example, cycle between transparent and opaque forms. They, like other technologically important liquid crystals, are electrically insulating. Semiconducting crystals could have much broader application than insulating crystals, but large single crystals of these materials are difficult and expensive to produce. In a recent breakthrough, a family of liquid crystalline derivatives of perylene diimide was discovered that has semiconductor properties. The films of one compound self organize from a red, polycrystalline phase with randomly oriented crystallites into a black phase with highly ordered ribbon-like structure. The fluorescence intensity increases seven-fold during the transformation. This spontaneous change in photophysical properties makes this class of organic liquid crystals look very promising for future photoconversion applications.
- *Diode Lasers Detect Radiotoxic Isotopes.* Solid-state diode lasers, similar to those used in compact disc players, have been used in a new approach to detect the toxic radioisotope strontium-90, which received attention because of high levels found in milk after atomic weapons tests and the Chernobyl reactor accident. Diode lasers excite and efficiently ionize the strontium atoms; the resulting ions are detected using a mass spectrometer. The high efficiency allows the detection of less than one femtogram (femto = 10^{-15}, e.g., a single postage stamp compared to the area of Texas) of strontium 90. Furthermore, it is possible to selectively ionize the strontium 90 even in the presence of large excesses of the stable, naturally-occurring isotopes of strontium. Measurements can be performed in a few minutes as compared to the several weeks required previously for conventional radiochemical decay counting methods. Thus, this new approach should significantly improve the capabilities for near real-time monitoring of environmental restoration activities, nuclear weapons tests, reactor accidents, and the processing of nuclear fuels.

- *Photochemical Studies on the Light-Activated Drug Hypericin.* The popular herbal remedy St. John's wort contains the compound hypericin which, upon exposure to light, is toxic to tumors and HIV, the human AIDS virus. Now, the fundamental photochemistry of hypericin has been elucidated. A novel laser spectroscopic technique, fluorescence upconversion, was used to show definitively that the primary photochemical process is excited-state intramolecular proton or hydrogen transfer. Any incomplete proton or hydrogen atom transfers would acidfy the aqueous solution immediately surrounding hypericin, which may be of importance in its toxicity to viruses. The study is yet another example of the role that the physical sciences play in providing fundamental information relevant to a wide variety of subject areas.

Engineering and Geosciences

- *Remote Sensing of Fractures and Prediction of Failure in Rocks.* Long before catastrophic fracturing and failure of a material, sound waves transmitted through the material show a dramatic frequency shift. This shift has been documented before in fractured materials, but the observation of the shift *before* the formation of a continuous crack is a new discovery. Monitoring for the frequency shift can therefore be used to provide a warning of failure. The sound shifts to a lower frequency because the high-frequency sound (with shorter wavelengths) is preferentially absorbed or scattered. Because the frequency shift occurs prior to creation of a single fracture, there should be a network of oriented, disconnected features appearing prior to a crack that absorb or scatter the high-frequency sound in the same way as do observable cracks. Connected cracks in rocks provide pathways for water, oil, or pollutant flow. The growth of cracks can improve fluid flow or cause failure of well-bores, reservoirs, and tunnels or engineered structures; therefore, it is very important to understand how and when cracks form.

Energy Biosciences

- *The 1997 Nobel Prize in Chemistry.* Dr. Paul D. Boyer shared in the 1997 Nobel Prize in Chemistry for "elucidation of the enzymatic mechanism underlying the synthesis of adenosine triphosphate (ATP)." The energy captured from photosynthesis or released from respiration is converted into ATP, which is used for maintenance of cells, synthesis of cellular components, and other energy-requiring processes such as movement. ATP is frequently referred to as the "energy currency" of the cell. Dr. Boyer's work at the University of California at Los Angeles was supported in part by the Division of Energy Biosciences and its predecessor organizations from 1963 until 1993 under a project entitled "Energy Capture and Use in Plants and Bacteria."
- *Building Doors into Cells.* Before any molecule can enter a cell, it must first pass through the cell membrane—the thin, fat-containing film that covers all cells. The passage of most molecules through biological membranes is controlled by pores, defined openings made with specific proteins. The composition and structure of pore proteins can now be altered through genetic engineering. Changes in the size of the pore, the selectivity of the pore for letting different molecules pass through, and the pore's ability to open and close are three properties

currently being studied by bioengineering new pore proteins. Successful attempts to engineer modified pore opening and closing properties have provided insight on how these processes can occur mechanistically as well as for developing new biotechnological applications. Among the potential products of this research are chemical triggers or molecular switches that can be used to create new sensors to detect harmful chemicals or viruses. Other potential applications are the development of small light switches and new drug delivery systems.

Scientific Facilities Utilization

The BES program request includes $311,035,000 to maintain support of the scientific user facilities. Within this overall level of support is a partial cost-of-living increase for facility operations and an increase in funding for the High-Flux Isotope Reactor at Oak Ridge National to continue activities related to the replacement of the beryllium reflector and associated beamline upgrades. The reduction in support for the scientific user facilities from that of FY 1999 is primarily a result of the decrease in R&D for the Spallation Neutron Source. Support for facility operations is maintained at as high a level as possible consistent with budgetary constraints. Research communities that have benefited from the BES supported Scientific Facilities Initiative include materials sciences, chemical sciences, earth and geosciences, environmental sciences, structural biology, superconductor technology, medical research, and industrial technology development. More detailed descriptions of the specific facilities and their funding are given in the subprogram narratives and in the sections entitled "Site Description" and "Major User Facilities."

Spallation Neutron Source (SNS) Project

The purpose of the SNS Project is to provide a next-generation short-pulse spallation neutron source for neutron scattering and related research in broad areas of the physical, chemical, materials, biological, and medical sciences. The SNS will be the world's most powerful accelerator-based, pulsed neutron source producing 6-10 times more neutrons than any other such source. It will be used by researchers from academia, national labs, and industry for basic and applied research and for technology development in the fields of condensed matter physics, materials sciences, magnetic materials, polymers and complex fluids, chemistry, biology, and engineering. It is anticipated that the facility will be used by 1,000-2,000 scientists and engineers annually and that it will meet the Nation's need for neutron science capabilities well into the next century.

The SNS will consist of a linear accelerator (linac)-ring system that will deliver short pulses of protons to a mercury target where neutrons will be produced by a nuclear reaction process called spallation. The high-energy neutrons so produced will be moderated (i.e., slowed down) to reduce their energies. The "moderated" neutron beams will then be used for neutron scattering experiments. Specially designed scientific instruments will use these pulsed neutron beams for a wide variety of investigations on all types of materials.

As the needs of our high-technology society have changed, so has the way we do R&D on new materials to meet these needs. It has become increasingly important to develop new materials that perform under severe conditions and yet are stronger, lighter, and cheaper. Major research facilities, such as the BES synchrotron and neutron sources, are used to understand and "engineer" materials at the atomic level so that they have improved macroscopic properties and perform better in new applications. The SNS is a next-generation facility for just such applications. Neutron scattering will play a role in all forms of materials understanding and design, including the development of smaller and faster electronic devices; lightweight alloys, plastics, and polymers for transportation and other applications; magnetic materials for more efficient motors and for improved magnetic storage capacity; and new drugs for medical care.

The importance of neutron science for fundamental discoveries and technological development is now universally acknowledged. The scientific justification and need for a new pulsed neutron source and instrumentation in the U.S. have been thoroughly established by numerous studies by the scientific community since the 1970s. These include the 1984 National Research Council study "Major Facilities for Materials Research and Related Disciplines" (the Seitz-Eastman Report), which recommended the immediate start of the design of both a steady-state source and an accelerator-based pulsed spallation source. More recently, the 1993 DOE Basic Energy Sciences Advisory Committee (BESAC) report "Neutron Sources for America's Future" (the Kohn Panel Report) again included construction of a new pulsed spallation source with SNS capabilities among its highest priorities. This conclusion was even more strongly reaffirmed by the 1996 BESAC Report (the Russell Panel Report), which recommended the construction of a 1 MW spallation source that could be upgraded to significantly higher powers in the future.

The conceptual design of the SNS -- which was an interlaboratory effort involving Lawrence Berkeley National Laboratory in the ion source, Los Alamos National Laboratory in the linear accelerator, Brookhaven National Laboratory in the accumulator ring, and Argonne National Laboratory in targets and moderators -- was completed in June of 1997. The design conforms to the recommendations of the Russell Panel Report. The power will be in the 1 megawatt range or about six times that of the highest currently available worldwide, and the design will allow for significantly higher powers at a later stage. The design will further include moderators for neutrons with appropriate spectral and temporal characteristics in the epithermal, thermal, and cold energy ranges. There will be the potential for at least three target areas and for 30 to 40 instruments.

Agreements are in place with Rutherford Appleton Laboratory (England), the European Spallation Source project, and the Japanese Atomic Energy Research Institute to allow joint research and development. Furthermore, a Working Group on Neutron Sources has been established under the Megascience Forum of the Organization for Economic Cooperation and Development. A User Committee has been formed, consisting of distinguished members of the neutron science community, to provide input on instrumentation and on user needs.

FY 1999 funding provided for the start of Title I design activities, initiation of subcontracts and long-lead procurements, and continued critical research and development work necessary to reduce technical and schedule risks. FY 2000 funding of $214,000,000 is requested for the SNS

Project for detailed design (Title II) for the ion source, low-energy beam transport, LINAC structure and magnet systems, target assemblies, experimental instruments, and global control systems. Detailed design will be completed for several conventional facilities in preparation for the installation of major equipment in the following fiscal year; design will be completed on the front-end building, LINAC tunnel, high-energy beam transport tunnel, ring-service building, ring-to-beam transport tunnel, and the klystron hall. Construction will start for some conventional facilities including roads into the site, site preparation/grading, waste systems, and retention basins. Procurement for several significant equipment items such as dipole magnets, material for the target transport systems, and klystrons will begin. Project Management and Project Integration activities, which are exceptionally important during this phase of the project, will also be conducted. The Preliminary Safety Analysis Report (PSAR) will be completed during the fiscal year and work will begin on the final report. Additional information on the SNS project is provided in the SNS construction project data sheet, project number 99-E-334.

Facility Enhancements

BES will continue to support ongoing enhancements and maintenance activities of existing reactor and spallation neutron sources. (1) Fabrication of instrumentation will continue for the short-pulse spallation source at the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center (LANSCE). This instrumentation enhancement project was undertaken concurrently with an accelerator enhancement project funded by the Department's Office of Defense Programs. Together, these enhancements will result in a short-pulse spallation source facility equivalent to ISIS in Great Britain, currently the world's best for neutron scattering. This facility meets the requirements set by BESAC for an interim facility to the SNS at least as good as the ISIS facility. (2) The beryllium reflector at the High Flux Isotope Reactor at Oak Ridge National Laboratory is being changed. This is a scheduled maintenance operation that addresses the normal lifetime limitations of the beryllium reflector. Work was initiated in FY 1998 and will be completed in FY 2000. At the same time that the beryllium reflector, beam tubes and shutters, and monochrometer shields are replaced, several improvements will be made to instrumentation, beam tubes, and monochrometers. The improvements will provide increases in flux to the sample by factors of 2 to 3 times that of the Institute Laue Langevin, the world's best reactor neutron source. These improvements to HFIR were recommended by BESAC.

Partnerships for Academic-Industrial Research (PAIR) Program

The Partnerships for Academic-Industrial Research (PAIR) Program. Pending the results of an evaluation of ongoing awards, an additional $1,500,000 may be allocated to the PAIR program for a total budget of $3,000,000. This program is designed to encourage and facilitate research partnerships between academic researchers, their students, and industrial researchers. The PAIR program encompasses the entire range of research supported by the BES program. Grants are awarded on the basis of competitive peer review to university researchers for support of

fundamental, long-term, high-risk work that is jointly defined by the academic and industrial research partners and that supports a student or postdoctoral fellow from the university, who will spend at least four weeks per year in the industrial setting.

Complex and Collective Phenomena Program

The program in Complex and Collective Phenomena. In FY 2000, an additional $4,500,000 will be allocated to the program in Complex and Collective Phenomena for a total budget of $7,500,000. Much of the research supported by the BES program and its predecessor organizations during the past 50 years has been devoted to solving very difficult problems in idealized, simple systems. The challenge now is to use that knowledge to understand complex systems. This initiative supports work at the frontiers of basic research. Work is intended to be revolutionary rather than evolutionary, and it is expected that it may involve multidisciplinary and/or interdisciplinary efforts. Further it is expected to bridge the gap between an atomic level understanding (reductionist view) and a continuum mechanics understanding (classical view) of complex and collective phenomena. Awards are made on the basis of competitive peer review to university and DOE laboratory researchers. The initiative is open to the entire range of disciplines supported by the BES program. Some important categories of studies that might be included within the initiative in Complex and Collective Phenomena are:

Materials that are beyond binary; that lack stochiometry; that are far from equilibrium; that have little or no symmetry or low dimensionality. Often properties and behaviors that we desire exist only in "non ideal compounds," i.e., those that are made from more than a few elements, made in non stoichiometric combinations, made far from equilibrium; or made in one or two dimensions. These classes of materials, which will dominate the next generation of energy technologies, pose new challenges and opportunities because of their complexity.

Functional synthesis. The ability to *predict* structure/function relationships remains elusive. Because function can be exquisitely sensitive to even minor changes in both composition and structure and because the number of combinations is virtually boundless, we are unable to predict what combinations of elements and arrangements of atoms give rise to desired properties such as superconductivity, magnetism, ductility, toughness, strength, resistance, catalytic function, or enzymatic function.

The control of entropy. To a scientist, entropy has a precise mathematical definition; however, to a nonscientist, entropy can be viewed as synonymous with disorder. A standard maxim in physics is that "the entropy of the universe tends to increase," i.e., things become increasingly disordered with time. Interestingly, most of our energy now comes from fossil fuels that were derived from photosynthesis — the ability of plants to reduce entropy locally by absorbing sunlight and converting carbon dioxide to lower-entropy hydrocarbons, polysaccharides, and other compounds. However, even though photosynthesis has been studied for decades, we still do not completely understand it nor have we been able to duplicate or improve on it. This one example of the control of entropy — the ability to mimic the functions of plants — remains one of the outstanding challenges in the natural sciences.

Phenomena beyond the independent particle approximation. Phenomena beyond the independent particle model — that by their nature are collective — challenge our understanding of the natural world and require major advances in theory, modeling, computing, and experiment. Collective phenomena include widely diverse phenomena in the gas and condensed phases, including Bose-Einstein condensation, high-temperature superconductivity, and electron correlation.

Scaling in space and time. Research in chemistry, materials, geosciences, and biosciences covers lengths from the atomic scale to the cellular scale to the meter scale and times from femtoseconds to millennia. We understand single atoms, molecules, and pure crystals fairly well; but, when we go beyond these simple systems to larger more complex systems, our understanding is limited. Understanding phenomena over wide time scales is also important — from femtoseconds in spectroscopy to decades in the regulatory system of plants to thousands of years in radioactive waste disposal.

Climate Change Technology Initiative

Overview

The FY 2000 budget contains two carbon related programs, each of which cut across several agencies. The first is the Climate Change Technology Initiative (CCTI). That part of the CCTI that is within the Office of Science is a joint activity between the Biological and Environmental Research (BER) and Basic Energy Sciences (BES) programs. The second program is the U.S. Global Change Research Program (USGCRP) that spans eleven agencies and is coordinated through the National Science and Technology Council's Committee on Environment and Natural Resources. Within DOE, the BER program plays the lead role in USGCRP activities. Although the two programs, CCTI and USGCRP, are synergistic, they are different. USGCRP research focuses on developing the fundamental understanding of the comprehensive climate system and the global and regional adaptations to it. The CCTI focuses on the underpinning fundamental science that will enable mitigation of climate change while maintaining a robust National economy. All research in the CCTI will be peer-reviewed fundamental scientific research; no funds will be devoted to policy studies.

Eighty-five percent of our Nation's energy results from the burning of fossil fuels, a process that adds carbon to the atmosphere — principally in the form of carbon dioxide — from the sequestered fossil reservoir. Because of the potential environmental impacts of increases in atmospheric carbon dioxide, carbon management has become an international concern and has become a focus of the Climate Change Technology Initiative. A comprehensive research and development program that meets the needs of the Climate Change Technology Initiative addresses the diverse aspects of this problem. The Office of Science is well positioned to make significant contributions to the many solutions needed for this problem, as it is set to build on the fundamental discoveries of its core programs and extend them to the new discoveries needed to make carbon management practical and efficient. Science core programs include research on both carbon and non-carbon energy sources and on both carbon sequestration and carbon recycling. These core activities can now be exploited in the generation of the carbon management science

that will underpin the technologies of the future. The theme of efficiency in energy production and use must span the entire range of research activities. Research on carbon energy sources, and their impacts, is a focal point of interagency activity through the U.S. Global Change Research Program (USGCRP). Research on non-carbon energy sources is also a focal point of intra-agency activities and is led by the DOE Office of Energy Efficiency and Renewable Energy. The DOE Office of Science, through activities in both the Basic Energy Sciences (BES) program and the Biological and Environmental Research (BER) program, supports research that underpins both efforts.

A research program in carbon management would include:

- science for efficient technologies,
- fundamental science underpinning advances in all low/no carbon energy sources, and
- sequestration science.

Science has long-standing programs in fundamental research that already impact the three categories. In the BES program, funds in the amount of $19,504,000, are provided specifically for carbon management science in the Climate Change Technology Initiative. This work will be a natural extension of the complementary, ongoing work in several programs in Science, and it will build on the foundation of excellent and relevant research already underway. Focus areas will be those that build on strengths of the current Science programs and that promise maximum impact in the area of carbon management.

Immediate Impacts of Expanded Effort in Climate Change Technology

Additional science efforts will not only address an immediate societal problem, but they will also have a major effect on many scientific disciplines by advancing the state of knowledge and by training students in areas of research that are important to carbon management. For example, biochemistry, molecular and cellular biology, structural biology, and genome science will be impacted, because the production of fuels and chemicals by plants and microorganisms and the interconversion of greenhouse gases requires a better understanding of metabolism, of the structure and function of sub-cellular components, and of enzymes. Similarly, the state-of-the-art in biochemistry, molecular biology, and ecology will be impacted. All of these biological processes are important in understanding the role of marine microorganisms in sequestering carbon. Improvements in combustion to reduce carbon emissions require a fundamental understanding in chemical dynamics and theoretical chemistry and physics. Conversion of sunlight to energy requires an understanding in many areas of science, including photochemistry, photosynthesis, metabolism, and solid state physics. The search for increased efficiency in energy production and use requires fundamental knowledge in ceramics, metals, polymers, solid state chemistry, and condensed matter physics for materials that can withstand higher temperatures, have lower coefficients of friction, and are stronger and lighter. Enhanced recovery of fuel resources and of disposal of carbon dioxide requires a fundamental understanding of geometric, structural, and hydrologic properties of reservoirs and of multiphase, nonlinear transport of fluids in porous and fractured structures. Crosscutting programs in nano- and meso-phase materials

involve research at the forefront of materials science, chemistry, engineering, surface science, and semiconductor physics.

The new research efforts supporting advances in low/no carbon energy technologies, as well as existing activities, will be closely coordinated with DOE's technology programs and will provide the knowledge base for the development of advanced technologies to reduce carbon dioxide emissions. Many of the activities will impact the Office of Energy Efficiency and Renewable Energy (EE) and the energy and transportation industry by providing options for increasing efficiency in automobiles by reducing weight; for increasing efficiency in the use of electricity by increasing the efficiency of electric motors and generators with better magnets; for increasing efficiency in the transmission of electricity by using superconductors; and for reducing energy consumption in manufacturing with improved sensors, controls, and processes. Much of this research program will provide the knowledge base needed to increase the use of renewable resources with research aimed at understanding the metabolism of carbon dioxide and the metabolic pathways to the production of methane and other biofuels. Other aspects of the research program impact the Office of Fossil Energy (FE) by providing a foundation for effective and safe underground sequestration, new materials, a better understanding of combustion, and improved catalysts.

Funding will be provided for areas of research in carbon cycle management including appropriate areas that will be jointly identified and implemented by the Biological and Environmental Research and Basic Energy Sciences programs. Solicitations will be used for individual research projects. Additionally, proposal notifications may be developed jointly with the DOE energy technology programs with the intention of establishing multi-disciplinary centers at universities and national laboratories that will use the full capabilities of the institutions for a research program in carbon cycle management encompassing, for example, topics in the following areas: integration and assessment; separations; efficiency; clean fuels; bioenergy; storage and conversion; enhanced natural terrestrial cycles; and enhanced use of major scientific user facilities to support carbon management research.

Interagency Environment

The Office of Science program in fundamental science supporting energy technologies will be closely coordinated with, and synergistic to, the activities in its sister agencies (e.g., NASA, NSF, NOAA, USDA, DOI, and EPA) within the USGCRP. Through its leadership role in decade to century climate prediction, the Office of Science has developed the research capability for comprehensive and large scale modeling of carbon dioxide impacts on climate, on ecology, and on ocean sciences, and this expertise is augmented by complementary activities in the other agencies. Similarly, the network of carbon flux measurements and ecological experiments that the Office of Science has developed serve as a backdrop to those of many other agencies, and the state-of-the-art can thus be pushed ahead more rapidly by capitalizing on the more rapidly growing base of knowledge. The Office of Science also has a leadership role within the USGCRP on consequence evaluation of increased greenhouse gases in global climate change, including integrated assessments that address both scientific and societal (including economic) impacts of carbon management. Finally, through its pre-eminent role in the Human Genome Program and its

development of the complementary Microbial Genome Program, the Office of Science program is ideally placed to support research that will focus on the application of genetic information of microorganisms to increase metabolic efficiency related to both carbon dioxide and conversion to fuels through photosynthesis.

BES Activities

Climate Change Technology Initiative

(dollars in thousands)

	FY 1999	FY 2000
Materials Sciences	1,708	3,415
Chemical Sciences	2,197	4,394
Engineering and Geosciences	1,464	6,822
Energy Biosciences	2,436	4,873
Total	7,805	19,504

As noted above, an inclusive climate change technology research and development program must address diverse aspects of the problem including: (1) carbon recycling; (2) improved efficiency in the use of fossil carbon energy sources; (3) new and improved non-carbon energy sources; and (4) carbon dioxide sequestration. The BES program has long supported fundamental research that impacts these categories and has particularly strong programs related to the first three. A comprehensive program in issues relating specifically to carbon management, therefore, finds a natural home with the scientific communities supported by BES.

Focus areas are those that promise the maximum impact in the area of carbon management and that build on strengths of current BES programs. In the Materials Sciences subprogram, research focuses on three areas: high-temperature materials for more efficient combustion, magnetic materials that reduce energy loss during use, and semiconductor materials for solar-energy conversion. In the Chemical Sciences subprogram, research emphasizes atomic and molecular level understanding of chemical processes to enable predictive capability. A major component of the research will aim at reducing emissions of carbon dioxide through fundamental understanding of the chemistries associated with combustion, catalysis, photochemical energy conversion, electrical energy storage, electrochemical interfaces, and molecular specific separation from complex mixtures. In the Engineering and Geosciences subprogram, research emphasizes areas that will impact carbon dioxide sequestration in subsurface geologic formations. The program will include research to: (1) understand the mechanical stability of porous and fractured reservoirs/aquifers; (2) understand multiphase fluid flow within the aquifers; and (3) understand the geochemical reactivity in relevant conditions. Finally, in the Energy Biosciences subprogram, research emphasizes the biological process of photosynthesis, which is central to global carbon cycling.

All of the BES activities in CCTI are closely related to DOE's technology programs and will provide the knowledge base for the development of advanced technologies to reduce CO_2 emissions. When combined with the complimentary activities within the Biological and Environmental Research program, this initiative will lead to the comprehensive carbon management research program described above.

Fundamental Research Relating to Solar and Renewable Energy Resources

Included in this request are funds in the amount of $47,100,000 that potentially impact solar and renewable energy resource production and use in the categories of "biomass," "wind energy," "photovoltaics," "hydrogen," and "other (solar photoconversion)." These funds support multidisciplinary, basic research in the BES Materials Sciences, Chemical Sciences, and Energy Biosciences subprograms.

These multidisciplinary research activities are also relevant to a number of other areas that impact energy. Funding totalling $6,300,000 in this category also addresses the Climate Change Technology Initiative. Indeed, the nature of most of the BES programs is to provide the results of basic research that impact a wide variety of applications. For example, research in the area of biomass focuses on understanding, at the mechanistic level, the biology of plants, algae, and non-medical microbes. While the majority of fundamental research on plants and non-medical microbes is directly related to biomass or renewables, the research also directly impacts many other disciplines and technologies including agricultural food production, plant-derived pharmaceuticals, textile fibers, wood and wood byproducts, environmental restoration, and fermentation technologies. Similarly, research in solar photoconversion focuses on the detailed nature of how molecules in the photo-excited state transfer electrons (and thus energy); this work impacts numerous technologies in addition to solar and renewable energy programs including sensors, molecular photonics, photodegradation of hazardous wastes, photoassisted synthesis of chemicals, new analytical techniques (or methodologies), soil science, biological electron transfer, and carbon dioxide photoreduction. As a final example, research in photovoltaics focuses primarily on semiconductor physics and the synthesis of semiconductor materials. These materials are also used in microprocessors, batteries, displays, sensors, electrochromic windows, and semiconductor alloys.

BES engages in appropriate partnerships to make the results of the BES research widely known and used. Examples include partnerships with the DOE technology offices and with other federal agencies. As a result, BES engages in many joint activities. For example, in photovoltaics, the Office of Energy Efficiency and Renewable Energy (EE) and BES together sponsored a workshop in 1993. Based on this workshop, a jointly funded project was started at NREL that resulted in record-breaking photovoltaic efficiencies. In general, research activities in biomass, wind energy, photovoltaics, hydrogen, and solar photoconversion are coordinated with EE through Coordinating Committees in the Department, through ad hoc meetings, through workshops, and through joint funding at universities and at the Department's laboratories.

In November, 1997, more than 30 program staff from the Office of Science (SC) — primarily from BES — and from EE Offices of Utility Technologies and Transportation Technologies met to discuss programs in the areas noted above. The EE programs involved include those of photovoltaic energy systems, solar thermal, hydrogen technologies, wind technologies, biomass power, and biofuels (transportation). Follow on one-on-one meetings between program managers of both offices are now being held for identification of research needs, gaps and areas of opportunity of possible joint program development. For example, in May 1998, BES program staff participated in a Workshop on Biohydrogen Production sponsored by EE's Hydrogen program and by the Engineering Directorate at NSF; BES staff further provided reviews of EE projects in the area of biological hydrogen production and recommendations for the overall direction of that program. Another outcome of the November 1997 meeting has been the re-establishment of a Department-wide technical committee in the area of bioenergy which includes program representatives from BES and EE and also from the Office of Environmental Management (EM) and the Office of Fossil Energy (FE). The purposes of the revitalized DOE Bio-Energy Coordinating Committee (BECC) are to: (a) achieve effective coordination of all DOE bio-energy research and development; (b) assure optimum use of DOE's existing expertise in the field of bio-energy research and development; and (c) achieve the most rapid communication among DOE program representatives of new developments, opportunities, and issues in the areas of bio-energy research, development, demonstration and commercialization. In a related effort, BES and EE's Office of Fuels Development are drafting a joint research topic on biofuels for the FY1999 SBIR Program Solicitation.

Funding of Contractor Security Clearances

In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $346,000 and $313,000 for estimated contractor clearances in FY 1999 and FY 2000, respectively, within this decision unit.

Scientific Simulation Initiative

This budget also includes the BES program's contribution to DOE's Scientific Simulation Initiative (SSI), an integrated effort bringing together computational and communication resources, focused research in scientific disciplines, and research in computer science and other enabling technologies to solve the complex problems that characterize DOE's scientific research

needs. The SSI couples research in advanced scientific applications in the programs of the Office of Science (SC) with research in computer science and enabling technologies and advanced computing and communications facilities. It is a joint program between the Computational and Technology Research (CTR) program and the other programs in SC. The overview of the integrated program is given in the overview of the CTR budget; however, the specific contributions of the BES program are described below.

BES, through its Chemical Sciences subprogram manages the SSI Combustion Systems integrated applications effort. BES's participation in the SSI also represents an important contribution to the broader Presidential initiative in information technology. The Chemical Sciences subprogram has been involved in combustion research for over two decades. The goal of this research effort is to develop, through simulation and modeling, a sufficiently deep and detailed understanding of combustion processes to accelerate the development, characterization, and validation of design tools for advanced combustion devices. Eighty-five percent of current U.S. energy use is derived from the combustion of fossil fuels. This dependence on fossil fuels is not likely to change in the coming decades. For transportation technologies alone, preliminary calculations suggest that improvement in direct-injection diesel thermal efficiency of 35% is possible, which could result in energy savings of 3.7 quads or $26 billion and reductions of carbon dioxide ($CO_{2)}$ emissions of 250 million tons per year. Combustion has been and remains one of the primary causes of lowered air quality in urban environments. Providing the knowledge that can lead to improved efficiency of the fossil fuel combustion process while reducing unwanted emissions remains one of among the highest priorities in the Nation's research portfolio. High fidelity combustion simulation and modeling may well be the path to significant breakthroughs in the ability of engineers to characterize, and therefore optimize and control, all aspects of combustion devices.

At present, engineers have neither sufficient knowledge nor the computational tools to understand and predict the chemical outcome of combustion processes. The design of combustion devices remains an Edisonian process dependent on intuition, experience, and time consuming trial and error. Computational models to guide the design process currently are of limited use because of the extraordinary complexity of the combustion process. This complexity derives from:

- the hundreds of chemical reactions that comprise combustion chemistry;
- fluid dynamics with turbulence scales covering 6 orders of magnitude; and
- interactions between chemistry and fluid dynamics involving time and spatial scales that cover 12 orders of magnitude.

The anticipated accomplishments of this research effort will allow the complete characterization of the chemistry and fluid dynamics of combustion processes and systems. The computational tools developed under this program, along with the new level of understanding of complex combustion phenomena, will allow engineers to design a new generation of combustion devices optimized for energy efficiency and pollution reduction.

The combustion modeling and simulation component of the SSI will be managed in a manner consistent with the way BES manages other projects and facilities. A program manager in the Office of Basic Energy Sciences will be appointed to be responsible for the effort. This manager will be assisted by a technical management and coordination office located at one of the DOE laboratories whose role is to ensure that the subelements remain tightly integrated. Research teams at laboratories and universities, as well as the technical management and coordination office, will be competitively selected in response to a published announcement and following peer review.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Basic Energy Sciences					
Research					
Materials Sciences	381,828	417,216	-2,530	414,686	407,636
Chemical Sciences	196,127	209,582	-2,745	206,837	215,577
Engineering and Geosciences	40,151	44,413	-1,674	42,739	37,545
Energy Biosciences	26,710	32,489	-2,627	29,862	31,226
Subtotal, Research	644,816	703,700	-9,576	694,124	691,984
Construction	7,000	105,400	0	105,400	196,100
Subtotal, Basic Energy Sciences	651,816	809,100	-9,576	799,524	888,084
Use of Prior Year Balances	-4,852 [a]	-4,002[a]	0	-4,002[a]	0
General Reduction for Policy Papers for CCTI		-8,000	8,000	0	0
General Reduction		-1,576	1,576	0	0
Total, Basic Energy Sciences	646,964 [b]	795,522	0	795,522	888,084

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Excludes $14,622,000 which has been transferred to the SBIR program and $877,000 which has been transferred to the STTR program.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	23,613	24,673	25,906	+1,233	+5.0%
National Renewable Energy Laboratory	4,515	4,193	3,744	-449	-10.7%
Sandia National Laboratories	28,764	26,600	22,008	-4,592	-17.3%
Total, Albuquerque Operations Office	56,892	55,466	51,658	-3,808	-6.9%
Chicago Operations Office					
Ames Laboratory	18,659	17,114	16,967	-147	-0.8%
Argonne National Laboratory, East	139,894	143,436	145,096	+1,660	+1.2%
Brookhaven National Laboratory	76,722	77,586	77,331	-255	-0.3%
Princeton Plasma Physics Laboratory	700	675	0	-675	-100.0%
Total, Chicago Operations Office	235,975	238,811	239,394	+583	+0.2%
Idaho Operations Office					
Idaho National Environmental and Engineering Laboratory	3,478	3,609	3,020	-589	-16.3%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	62,160	62,553	62,095	-458	-0.7%
Lawrence Livermore National Laboratory	5,933	6,044	5,236	-808	-13.4%
Stanford Linear Accelerator Facility (SSRL)	21,684	22,686	21,968	-718	-3.2%
Total, Oakland Operations Office	89,777	91,283	89,299	-1,984	-2.2%
Oak Ridge Operations Office					
Oak Ridge Inst. For Science & Education	2,003	1,258	1,541	+283	+22.5%
Oak Ridge National Laboratory	110,219	217,848	302,898	+85,050	+39.0%
Thomas Jefferson National Accelerator Facility	200	0	0	0	0.0%
Total, Oak Ridge Operations Office	112,422	219,106	304,439	+85,333	+38.9%
Richland Operations Office					
Pacific Northwest National Laboratory	12,868	12,788	12,947	+159	+1.2%
All Other Sites [a]	140,404	178,461	187,327	+8,866	+5.0%
Subtotal, Basic Energy Sciences	651,816	799,524	888,084	+88,560	+11.1%
Use of Prior Year Balances	-4,852 [b]	-4,002 [b]	0	+4,002	+100.0%
Total, Basic Energy Sciences	646,964 [c]	795,522	888,084	+92,562	+11.6%

[a] Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

[b] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[c] Excludes $14,622,000, which has been transferred to the SBIR program and $877,000, which has been transferred to the STTR program.

Site Description

Ames Laboratory

Ames Laboratory is a Multiprogram Laboratory located on 10 acres in Ames, Iowa. The laboratory was built on the campus of Iowa State University during World War II to emphasize the purification and science of rare earth materials. This emphasis continues today. The BES Materials Sciences subprogram supports experimental and theoretical research on rare earth elements in novel mechanical, magnetic, and superconducting materials. Ames scientists are leading experts on magnets, superconductors, and quasicrystals that incorporate rare earth elements. Recent innovations include the use of a rare earth alloy and the magnetocaloric effect to achieve efficient refrigeration without gases that are harmful to the atmosphere. The BES Chemical Sciences subprogram supports studies of heterogeneous electron transfer in self-assembled monolayers, ultrafast spectroscopic techniques to examine energy transfer phenomena, and studies of molecular beams to obtain highly accurate and precise thermochemical information for small molecules and radicals. Ames Laboratory continues to provide leadership in analytical chemistry with strength in organometallic based catalysis and heavy metal extraction chemistry important to high level wastes.

The laboratory is also home to the **Materials Preparation Center** (MPC), a user facility dedicated to the preparation, purification, and characterization of rare-earth, alkaline-earth, and refractory metal materials. Established in 1981, the MPC consolidates and makes available to scientists at university, industry, and government facilities the capabilities related to synthesis, processing, and characterization of advanced materials developed at Ames Laboratory during the course of its 40 years of basic research. Although the MPC is designated a national user facility, its operation differs from that of other such facilities in that the users do not conduct experimental or research activities within the Center; rather, they receive high purity materials or unique characterization services that are not available from commercial suppliers, on a full cost recovery basis. The MPC operates the Materials Referral System and Hotline and provides immeasurable value to the superconductivity community by publishing the bi-monthly High Tc Update.

Argonne National Laboratory

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on 1,700 acres in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. ANL is home to one of the largest BES research efforts in broad areas of materials, chemical, and geosciences, and it is the site of three BES supported user facilities -- the Advanced Photon Source (APS), the Intense Pulsed Neutron Source (IPNS), and the Electron Microscopy Center for Materials Research (EMC).

The Materials Sciences subprogram supports research in high-temperature superconductivity; polymeric superconductors; thin-film magnetism; surface science; the synthesis, characterization, and atomistic computer simulation of interfaces in advanced ceramic thin-films; the investigation of the effects of neutron, gamma, and ion-irradiation of solids; tribological investigation of the boundary films on aluminum and aluminum alloys; and synthesis and electronic and structural characterization of oxide ceramic materials, including high-temperature superconductors. The Chemical Sciences subprogram

supports research in actinide separations; fundamental physical and chemical properties of actinide compounds; structural aspects fundamental to advanced batteries and coal chemistry; experimental and theoretical studies of metal clusters of catalytically active transition metals; molecular dynamics of gas-phase chemical reactions of small molecules and radicals; photosynthesis mechanisms; and atomic, molecular, and optical physics. ANL has one of three pulsed radiolysis centers that together form a national research program in this area. The other two are at Brookhaven National Laboratory and Notre Dame University. The Engineering and Geosciences subprogram supports research on processes controlling the mobility of fluids and metals in the Earth's crust.

The **Advanced Photon Source** is one of only three third-generation, hard x-ray, synchrotron radiation light sources worldwide. Dedicated on May 1, 1996 by the Secretary of Energy, the project was completed five months ahead of schedule and for $13,000,000 less than the baseline construction budget of $811,000,000. The APS has met or exceeded all technical specifications. The design of the 7 GeV synchrotron is optimized for insertion devices. This high-brilliance light source will be used by as many as 2,000 users annually to study the structure and properties of materials in a variety of disciplines including condensed matter physics, materials sciences, chemistry, geosciences, structural biology, medical imaging, and environmental sciences. In addition, the light source will be used for a variety of technological applications, including micromachining and lithography.

The **Intense Pulsed Neutron Source** is a 30 Hz short-pulsed spallation neutron source using protons from a linac/rapid cycling synchrotron to produce neutrons in a depleted uranium target. Twelve beam lines serve 14 instruments, one of which is a test station for instrument development. IPNS was the first neutron or synchrotron source in the U.S. to operate all instruments in the user mode, with time allocated by an external committee. Distinguishing characteristics of IPNS include its innovative instrumentation and source technology and its dedication to serving the users. The first generation of virtually every pulsed source neutron scattering instrument was developed at IPNS. Scientists at IPNS have conceived techniques such as geometric and electronic time focusing, multi-chopper phasing, multiple converging aperture collimation, and neutron reflectometry. In addition, the source and moderator technologies developed at IPNS, including uranium targets, liquid hydrogen and methane moderators, solid methane moderators, and decoupled reflectors, have impacted spallation sources worldwide. Research at IPNS is conducted in the structure of high-temperature superconductors, alloys, composites, polymers, catalysts, liquids and non-crystalline materials, materials for advanced energy technologies, and biological materials. Staff at IPNS are taking a leadership role in the design and construction of instrumentation for the Spallation Neutron Source.

The **Electron Microscopy Center for Materials Research** provides in-situ, high-voltage and intermediate voltage, high-spatial resolution electron microscope capabilities for direct observation of ion-solid interactions during irradiation of samples with high-energy ion beams. The EMC employs a tandem accelerator for simultaneous ion irradiation and electron beam microcharacterization. It is the only instrumentation of its type in the Western Hemisphere. The unique combination of two ion accelerators and two microscopes permits direct, real-time, in-situ observation of the effects of ion and/or electron bombardment of materials and consequently attracts users from around the world.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a Multiprogram Laboratory located on 5,200 acres in Upton, New York. BNL is home to BES major research efforts in materials and chemical sciences as well as to efforts in geosciences and biosciences. BNL is also the site of two BES supported user facilities -- the National Synchrotron Light Source (NSLS) and the High Flux Beam Reactor (HFBR).

The Materials Sciences subprogram emphasizes experiments that make use of the NSLS and the HFBR. BNL scientists are among the world leaders in neutron and X-ray scattering applied to a wide variety of research problems such as high-temperature superconductivity, magnetism, structural and phase transformations in solids, and polymeric conductors. BNL has strong research programs in the structure and composition of grain boundaries and interfaces in high temperature superconductors, in aqueous and galvanic corrosion studies, and in the theory of alloy phases.

The Chemical Sciences subprogram supports one of three centers for pulsed radiolysis research at BNL. With the recent completion of a new innovative short-pulse radiation chemistry facility, BNL is well poised to contribute significantly to radiation sciences research for the next decade. There is also a forefront research project on the spectroscopy of reactive combustion intermediates and an active research effort on studies of the mechanisms of electron transfer related to artificial photosynthesis. Other Chemical Sciences research at BNL is focused around the unique capabilities of the NSLS in obtaining time dependant structural data of reacting systems, the structural changes accompanying catalytic and electrochemical reactions, and the formation of atmospheric aerosols and their reactivity.

The Energy Biosciences subprogram supports activities in the plant sciences, which include mechanistic and molecular-based studies on photosynthesis and lipid metabolism genetic systems. The studies on lipid biosynthesis may lead to exciting prospects for engineering new pathways for the synthesis of alternative fuels and petroleum-replacing chemicals. The Engineering and Geosciences subprogram supports synchrotron-based studies of rock-fluid interactions, particularly for investigations of diagenetic processes and synchrotron computed microtomography of porosity of reservoir rocks.

The **National Synchrotron Light Source** provides intense focused light from the infrared through the x-ray region of the spectrum by operating two electron storage rings: an X-ray ring and a vacuum ultraviolet (VUV) ring. X-Ray, ultraviolet, visible, and infra-red light from the storage rings is guided into 30 x-ray and 17 VUV beam ports, most of which are split into two to four experimental stations. The NSLS was commissioned in 1982. Annually, 2,300 scientists representing more than 350 institutions, over 50 of them corporations, conduct research at the NSLS in the fields of biology, chemistry, geology, materials science, medicine, metallurgy, and physics. In the basic sciences, researchers investigate the absorption and scattering of light to determine the properties of matter such as crystal structure, bonding energies of molecules, details of chemical and physical phase transformations, electronic structure and magnetic properties. The NSLS also serves as a training ground for future scientists. Between 1988 and 1998, over 600 students who earned doctorate degrees used the NSLS in their thesis research.

The **High Flux Beam Reactor**, commissioned in 1965, is a heavy-water cooled and moderated reactor designed to produce neutrons for scattering. In contrast to most reactors, which are designed to minimize the escape of neutrons from the core, the HFBR was expressly designed to maximize the number of neutrons available in external beams. The HFBR supports a range of neutron-based research in solid-state

and nuclear physics, chemistry, and structural biology. The reactor's 9 beam tubes deliver neutrons to 15 experimental facilities. Before the HFBR was put in standby mode in December, 1996, about 250 researchers conducted experiments at the facility annually. The HFBR will continue to be maintained in this standby mode while the Department evaluates options for its future.

Idaho National Environmental and Engineering Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) is a Multiprogram Laboratory located on 572,000 acres in Idaho Falls, Idaho. The Materials Sciences subprogram supports research in the modeling, growth, and properties of functionally gradient materials as an effective means of joining ceramic and metallic materials, on the microstructural evolution of rapidly solidified materials, and on high strength magnetic materials. The Chemical Sciences subprogram focuses on fundamental understanding of negative ion mass spectrometry, studies of secondary ion mass spectrometry, and computer simulation of ion motion and configuration of electromagnetic fields crucial to the design of ion optics. The Engineering and Geosciences subprogram supports studies to establish controls of biologically based engineering systems, to understand and improve the life expectancy of material systems used in engineering such as welded systems, to improve controls of nonlinear systems, and to develop new diagnostics techniques for engineering systems.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory (LBNL) is a Multiprogram Laboratory located in Berkeley, California, on a 200 acre site adjacent to the Berkeley campus of the University of California. LBNL is home to BES major research efforts in materials and chemical sciences as well as to efforts in geosciences, engineering, and biosciences. LBNL is also the site of two BES supported user facilities -- the Advanced Light Source (ALS) and the National Center for Electron Microscopy (NCEM).

The Materials Sciences subprogram supports research in laser spectroscopy, superconductivity, thin films, femtosecond processes, biopolymers, polymers and composites, surface science, and theory. Research is carried out on the fundamental features of evolving microstructures in solids; alloy-phase stability; structure and properties of transforming interfaces; and the structures of magnetic, optical, and electrical thin films and coatings. In the Center for Advanced Materials, research is conducted in the processing, mechanical fatigue, and high-temperature corrosion of structure ceramics and ceramic coatings; the synthesis, structure and properties of advanced semiconductor and semiconductor-metal systems; polymers; surface science and catalysis; and structure, development and magnetic properties of high performance metals and alloys. The Chemical Sciences subprogram has long excelled in fundamental, chemical dynamics research using molecular-beam techniques. Femtosecond spectroscopy studies of energy transfer on surfaces has also been developed. LBNL is recognized for its excellence in radiochemistry, the chemistry of the actinides, inorganic chemistry, and both homogeneous and heterogeneous chemical catalysis. The Engineering and Geosciences subprogram supports experimental and computational research on rock physics of porous and fractured rock, subsurface imaging through both seismologic and electromagnetic methods, and hydrologic research on fluid flow through both pores and fractures. Geochemical studies focus on advanced interpretations of low-temperature flow processes, innovations in analytical geochemistry, isotope and trace-element chemistry with mass spectrometric and

synchrotron-based analyses. Engineering research is concerned with the development of modern nonlinear dynamics with applications to problems in engineering sciences. The Energy Biosciences subprogram focuses on the physics of the photosynthetic apparatus and on the genesis of subcellular organelles.

The **Advanced Light Source**, which began operations in October 1993, is one of the world's brightest sources of ultraviolet light and soft X-rays. Soft X-rays of the ALS are an ideal tool for probing a wide range of electronic structural studies and are particularly useful for x-ray microscopy, surface science, and solid state physics of carbides, actinides and oxides. Such regions of the spectrum also offer special opportunities for research in chemical physics, electron spectroscopy, microscopy, and holography.

The **National Center for Electron Microscopy** provides instrumentation for high-resolution, electron-optical microcharacterization of atomic structure and composition of metals, ceramics, semiconductors, superconductors, and magnetic materials. The facility is home to the Nation's highest voltage microscope, one which specializes in high resolution studies.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a Multiprogram Laboratory located on 821 acres in Livermore, California. This laboratory was built in Livermore as a weapons laboratory some distance from the campus of the University of California at Berkeley to take advantage of the expertise of the university in the physical sciences. The Materials Sciences subprogram supports research in metals and alloys, ceramics, materials for lasers, superplasticity in alloys, and intermetallic metals. The Engineering and Geosciences subprogram supports research in the mechanisms and kinetics of low-temperature geochemical processes, laboratory research on the source of electromagnetic response in crustal rocks, modeling and laboratory experiments on rock fracturing, and reactive fluid flow and transport within fractures. The Chemical Sciences subprogram supports a new concept in catalysis, that of plasma assisted catalysis for environmental control of pollutants.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a Multiprogram Laboratory located on 27,000 acres in Los Alamos, New Mexico. LANL is home to BES major research efforts in materials sciences with other efforts in chemical sciences, geosciences, and engineering. LANL is also the site of an 800 MeV proton linac that is the basis for the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center (LANSCE).

The Materials Sciences subprogram supports research on strongly correlated electronic materials; the theory of evolving microstructures; and plasma immersion processes for ion-beam processing of surfaces for improved hardness, corrosion resistance, and wear resistance. The Chemical Sciences subprogram supports research to understand the electronic structure and reactivity of actinides through the study of organometallic compounds. Also supported is work to understand the chemistry of plutonium and other light actinides in both near-neutral pH conditions and under strongly alkaline conditions relevant to radioactive wastes. The BES Engineering and Geosciences subprogram supports experimental and theoretical research on rock physics, seismic imaging, and the physics of the Earth's electromagnetic field. Engineering research supports work to study the viscosity of mixtures of particles in liquids.

The **Los Alamos Neutron Science Center** provides an intense pulse source of neutrons for both national security research and civilian research. LANSCE comprises a high-power 800-million-electron-volt proton linear accelerator (linac), a Proton Storage Ring (PSR), production targets to the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center) and the Weapons Neutron Research (WNR) facility, and a variety of associated experiment areas and spectrometers. Researchers at LANSCE use neutrons to study materials such as polymers, catalysts, and structural composites that are essential for many modern industrial products. The Lujan Center features instruments for measurement of high-pressure and high-temperature samples, strain measurement, liquid studies, and texture measurement. The facility has a long history and extensive experience in handling actinide samples. A 30 Tesla magnet is being developed for use with neutron scattering.

National Renewable Energy Laboratory

National Renewable Energy Laboratory (NREL) is a program-dedicated laboratory (Solar) located on 300 acres in Golden, Colorado. NREL was built to emphasize renewable energy technologies such as photovoltaics and other means of exploiting solar energy. The Materials Sciences subprogram supports basic research efforts that underpin this technological emphasis at this laboratory. For example, theoretical and experimental research on processing and properties of advanced semiconductor alloys and structures provided the basis for the computer-aided design and fabrication of a prototype solar cell; this cell has achieved 30% efficiency in conversion of the solar spectrum into electric energy. The Chemical Sciences subprogram supports research addressing the fundamental understanding of solid-state, artificial photosynthetic systems. This research includes the preparation and study of novel dye-sensitized semiconductor electrodes, characterization of the photophysical and chemical properties of quantum dots, and study of charge carrier dynamics in semiconductors. There is also basic research in synthesis related to catalysis and to advanced battery research addressing high-efficiency, thin-film cathodes based on doped vanadium and manganese oxides. The BES Energy Biosciences subprogram funds programs to examine the mechanisms of photosynthetic oxygen evolution.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE) is located on 150 acres in Oak Ridge, Tennessee. The BES program provides funding to ORISE for support of a consortium of university and industry scientists to share the ORNL research station at NSLS to study the atomic and molecular structure of matter (known as ORSOAR, the Oak Ridge Synchrotron Organization for Advanced Research). The BES program also funds ORISE to provide support for expert panel reviews of major new proposal competitions, external peer review of DOE laboratory programs, technical review of proposals for DOE's EPSCoR program, and EPSCoR site reviews and the evaluation of program needs and impacts. ORISE also assists in the writing of annual BES subprogram summary books, the administration of topical scientific workshops, and provides support for other activities such as for the review of the Spallation Neutron Source Conceptual Design Report.

ORISE manages the **Shared Research Equipment Program** (SHaRE) at ORNL. The SHaRE Program has made available state-of-the-art electron beam microcharacterization facilities for collaboration with researchers from universities, industry and other government laboratories.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a Multiprogram Laboratory located on 24,000 acres in Oak Ridge, Tennessee. ORNL is home to major research efforts in materials and chemical sciences with additional programs in engineering and geosciences. It is the site of the High Flux Isotope Reactor (HFIR) and the Radiochemical and Engineering Development Center (REDC). ORNL also leads the five-laboratory collaboration that will design and construct the Spallation Neutron Source (SNS).

ORNL has perhaps the most comprehensive materials research program in the country. The Materials Sciences subprogram supports basic research which underpins technological programs such as the energy efficiency program in superconductivity. Research is supported in superconductivity, magnetic materials, neutron scattering and x-ray scattering, electron microscopy, pulsed laser ablation, thin films, lithium battery materials, thermoelectric materials, surfaces, polymers, structural ceramics, alloys; and intermetallics. Research is carried out on the fundamentals of welding and joining and on welding strategies for a new generation of automobiles. The subprogram emphasizes experiments at HFIR and other specialized research facilities that include the High Temperature Materials Laboratory, the Shared Research Equipment (SHaRE) Program, and the Surface Modification and Characterization Facility.

The Chemical Sciences subprogram supports research in analytical chemistry, particularly in the area of mass spectrometry, separations chemistry, and thermo-physical properties. Examples of the science include solvation in supercritical fluids, electric field-assisted separations, speciation of actinide elements, ion-imprinted sol-gels for actinide separations, ligand design, stability of macromolecules and ion fragmentation, imaging of organic and biological materials with secondary ion mass spectrometry, and the physics of highly charged species.

The Engineering and Geosciences subprogram investigates experimental and analytical geochemistry with innovative technical approaches for low-temperature geochemical processes in reservoirs and crustal rocks. Engineering research supports the Center for Engineering Systems Advanced Research with emphasis in computational nonlinear sciences such as advanced use of neural nets and sensor fusion, stochastic approximations, and global optimization of cooperating autonomous systems such as cooperating, autolearning robots.

The **High Flux Isotope Reactor** is a light-water cooled and moderated reactor with a design power level of 100 megawatts currently operating at 85 megawatts. HFIR provides state-of-the-art facilities for neutron scattering and materials irradiation and is the world's leading source of elements heavier than plutonium for research, medicine, and industrial applications. HFIR has four horizontal beam tubes, which terminate in the neutron scattering beam room. There are a total of 11 instruments in the beam room and one additional instrument on the upper level. The installation of the new liquid hydrogen cold source will provide beams of cold neutrons for scattering research that are as bright as any in the world.

The **Radiochemical Engineering Development Center**, located adjacent to HFIR, provides unique capabilities for the processing, separation, and purification of transplutonium elements.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL) is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. The BES Chemical Sciences subprogram supports research in theory and experiment related to the significant environmental clean-up concerns of the Department. Experimental research includes interfacial chemistry of water-oxide systems, near-field optical microscopy of single molecules on surfaces, inorganic molecular clusters, and direct photon and/or electron excitation of surfaces and surface species. Programs in analytical chemistry and in applications of theoretical chemistry to understanding surface catalysis are also supported by the Chemical Sciences subprogram; included are high-resolution laser spectroscopy for analysis of trace metals on ultra small samples, understanding the fundamental inter- and intra-molecular effects unique to solvation in supercritical fluids, and interfacing theoretical chemistry with experimental methods to address complex questions in catalysis. Theoretical, ab-initio quantum molecular calculations are integrated with modeling and experiment. The Materials Sciences subprogram supports research on stress-corrosion cracking of metals and alloys, high-temperature corrosion fatigue of ceramic materials, and irradiation effects in ceramic materials relevant to radioactive waste containment. The Engineering and Geosciences program supports research on basic theoretical and experimental geochemical research that underpins technologies important for the Department's environmental missions and research to improve our understanding of the phase change phenomena in microchannels.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory (PPPL) is a program-dedicated laboratory (Fusion Energy Sciences) located on 72 acres in Princeton, New Jersey. The Basic Energy Sciences (BES) program funds a research program that is part of the Department's participation in the AMTEX Partnership™ to enhance the competitiveness of the U.S. Textile Industry. The program, entitled On-Line Process Control (OPCon), seeks to identify and develop technologies to provide faster transition between products, efficient production of small lots, and improved economics via elimination of off-quality production and off-line testing. The BES supported work is focussed on development of instrumentation to measure fiber morphology in real time during synthetic fiber production by analysis of passive and active light scattering to measure birefringence of fibers.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a Multiprogram Laboratory located on 3,700 acres in Albuquerque, New Mexico (SNL/A), with sites in Livermore, California (SNL/L), and Tonapah, Nevada. SNL is home to significant research efforts in materials and chemical sciences with additional programs in engineering and geosciences. SNL is also the site of the Combustion Research Facility (CRF).

SNL has a historic emphasis on electronic components needed for Defense Programs. The laboratory has very modern facilities in which unusual microcircuits and structures can be fabricated out of various semiconductors. Many of the research projects supported by the Materials Sciences subprogram at SNL/A are relevant to the overall mission of the laboratory. Included among these are projects on the processing and properties sol-gel chemistry of ceramic coatings; the development of nanocrystalline

materials through the use of inverse micelles; adhesion and wetting of surfaces of metals, glass, and ceramic materials; theoretical and experimental research of defects; and interfaces in metals and alloys. The leading program on the theory, structure, and dynamics of two-dimensional surface alloys is at SNL/L.

The BES geophysics research effort at SNL/A supports fundamental laboratory and imaging studies on rock mechanics, seismologic, and electromagnetic inversion studies, and experimental and theoretical studies on fluid and particulate flow in porous and fractured rock. Geosciences research focuses on theoretical and experimental geochemical investigations of stability and transport within minerals stable in the Earth's crust. Engineering research addresses the viscosity of mixtures of particles in liquids.

The **Combustion Research Facility** at SNL/L is an internationally recognized facility for the study of combustion science and technology. In-house efforts combine theory, modeling, and experiment including diagnostic development, kinetics, and dynamics. Basic research supported by the Chemical Sciences subprogram is often done in close collaboration with applied problems. Several innovative non-intrusive optical diagnostics such as degenerate four-wave mixing, cavity ring-down spectroscopies, high resolution optical spectroscopy, and ion-imaging techniques have been developed to characterize combustion intermediates. A principal effort in turbulent combustion is coordinated among the BES chemical physics program, the Office of Fossil Energy, and the Office of Energy Efficiency and Renewable Energy.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center (SLAC) is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. It is the home of the Stanford Synchrotron Radiation Laboratory (SSRL) and peer-reviewed research projects associated with SSRL. The **Stanford Synchrotron Radiation Laboratory** was built in 1974 to take the intense x-ray beams from the SPEAR storage ring that was built for particle physics by the SLAC laboratory. Over the years, the SSRL grew to be one of the main innovators in the production and use of synchrotron radiation with the development of wigglers and undulators that form the basis of all third generation synchrotron sources. The facility is now comprised of 25 experimental stations and is used each year by over 700 researchers from industry, government laboratories and universities. These include astronomers, biologists, chemical engineers, chemists, electrical engineers, environmental scientists, geologists, materials scientists, and physicists. The Materials Sciences subprogram supports a research program at SSRL with emphasis in both the x-ray and ultraviolet regions of the spectrum. SSRL scientists are world leaders in photoemission studies of high-temperature superconductors and in x-ray scattering.

Thomas Jefferson National Accelerator Facility

Thomas Jefferson National Accelerator Facility (TJNAF) is a program-dedicated laboratory (Nuclear Physics) located on 273 acres in Newport News, Virginia. The Basic Energy Sciences program funds a research project at TJNAF related to fourth generation light sources based on linac-driven free electron lasers.

All Other Sites

The BES program funds research at 135 colleges/universities located in 43 states. This line also includes funding of research awaiting distribution pending completion of peer review results.

Materials Sciences

Mission Supporting Goals and Objectives

The Materials Sciences subprogram supports basic research in condensed matter physics, metals and ceramics sciences, and materials chemistry. This basic research seeks to understand the atomistic basis of materials properties and behavior and how to make materials perform better at acceptable cost through new methods of synthesis and processing. Basic research is supported in corrosion, metals, ceramics, alloys, semiconductors, superconductors, polymers, metallic glasses, ceramic matrix composites, catalytic materials, non-destructive evaluation, magnetic materials, surface science, neutron and x-ray scattering, chemical and physical properties, and new instrumentation. Ultimately the research leads to the development of materials that improve the efficiency, economy, environmental acceptability, and safety in energy generation, conversion, transmission, and use. These material studies affect developments in numerous areas, such as the efficiency of electric motors and generators; solar energy conversion; batteries and fuel cells; stronger, lighter materials for vehicles; welding and joining of materials; plastics; and petroleum refining.

Climate Change Technology Initiative. Research routes to improved carbon management in support of the Climate Change Technology Initiative include improved heat and corrosion resistant alloys to increase the efficiency of power generation, reducing energy losses in motors via improved magnetic materials, and displacing fossil fuels with higher-efficiency photovoltaic cells.

Performance Measures

- Continue Partnerships for Academic-Industrial Research where peer reviewed grants are awarded to university researchers for fundamental, high-risk work jointly defined by the academic and industrial research partners.
- Continue fabrication of instrumentation for the short-pulse spallation source at the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Materials Sciences Research	195,752	187,793	188,342	+549	+0.3%
Facilities Operations	186,076	217,104	209,599	-7,505	-3.5%
SBIR/STTR	0	9,789	9,695	-94	-1.0%
Total, Materials Sciences	381,828	414,686	407,636	-7,050	-1.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Materials Sciences Research			
■ **Structure of Materials:** This activity supports basic research in the characterization and structure of materials; the relationship of structure to the behavior and performance of materials; predictive theory and modeling; and new materials such as bulk metallic glasses and dimensionally restricted forms (films, dots) of materials. This activity provides world-class scientific user facilities to the Nation through the operation of four complementary and network interfaced electron beam microcharacterization user centers. These centers contain a variety of highly specialized instruments that complement each other in terms of their ability to characterize localized atomic positions and configurations, chemical gradients, interatomic bonding forces, etc. Major activities in FY 2000 will be responsive to the increasing demand for advanced facilities and models with capabilities to characterize and interpret the atomic structure, composition, bonding, and physical properties of materials with improved resolution and accuracy. Capital equipment needs for FY 2000 are expected to relate to facility refurbishment and upgrade.	24,455	25,655	25,390
■ **Mechanical Behavior and Radiation Effects:** These activities support basic research in the mechanical behavior of materials including load-bearing capability, failure and fatigue resistance, fracture toughness and impact resistance, high-temperature strength and dimensional stability, ductility or deformability of materials that is critical to their ease of fabrication, and radiation effects including understanding and modeling of radiation damage and surface modification using ion implantation. These activities relate to energy production and conversion through the need for failure resistant materials that perform reliably in the hostile and demanding			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
environments of energy production and use. The scientific results of this program also contribute to DOE missions in the areas of fossil energy, fusion energy, and radioactive waste storage. Major activities in FY 2000 will include continued development of experimental techniques and methods for the characterization of properties, the advancement of models and theories for interpretation, and the design and investigation of new materials and material structures. Capital equipment is needed for mechanical testing machines, especially with high-temperature capabilities, furnaces, and characterization equipment.	15,223	15,965	15,800
■ **Physical Behavior:** These activities support basic research in the physical behavior of materials, including aqueous, galvanic, and high-temperature gaseous corrosion and their prevention; photovoltaics and photovoltaic junctions and interfaces for solar energy conversion; the relationship to crystal defects and processing parameters to the superconducting current parameters for high-temperature superconductors; phase equilibria and kinetics of reactions in materials in hostile environments such as in the very high temperatures encountered in energy conversion processes; diffusion and the transport of ions in ceramic electrolytes for improved performance batteries and fuel cells. Major efforts in FY 2000 will continue fundamental studies of the mechanisms governing material response to aqueous, galvanic, and high-temperature gaseous corrosion; the processing and investigation of semiconductor materials and structures leading to enhanced solar energy conversion efficiencies; crystal defects, grain boundaries and interfaces for high-temperature superconductors; mechanisms controlling material response to hostile environments; and the structure and behavior of ceramic electrolytes for advanced fuel cells. Capital equipment is needed for corrosion studies and for electronic and spectroscopy instruments for the characterization of electronic, optoelectronic properties, and electrical properties of semiconductors, superconductors, and fuel cell electrolytes.	13,562	14,225	14,078

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Engineering Behavior:** These activities support basic research in the engineering behavior of materials. The research includes the synthesis and processing of materials with new or improved behavior, for minimization of waste, and with hard and wear resistant surfaces to reduce friction and wear; high-rate, superplastic forming of light-weight, metallic alloys for fuel efficient vehicles; high-temperature, structural ceramics and ceramic matrix composites for high-speed cutting tools and fuel efficient and low-pollutant engines; non-destructive analysis for early warning of impending failure and flaw detection during production; response of magnetic materials to applied static and cyclical stress; plasma, laser, charged particle beam surface modification to increase corrosion resistance; processing of high-temperature, intermetallic alloys. These activities underpin many of the DOE technology programs, and appropriate linkages have been established in the areas of light-weight, metallic alloys; structural ceramics; high-temperature superconductors; and industrial materials, such as intermetallic alloys. The activity includes the operation of the Materials Preparation Center that makes available small quantities of specialized research quality materials for research purposes that are not commercially or otherwise available. Major activities for FY 2000 will include continued work on design of new material compositions and structures, synthesis and processing new and enhanced materials, and characterization and interpretation of material behavior. Capital equipment includes furnaces, lasers, processing equipment, plasma and ion sources, and deposition equipment.	20,211	21,205	20,985
■ **Neutron and X-ray Scattering:** This activity supports basic research in condensed matter physics that makes use of neutron and x-ray scattering at major BES-supported user facilities. This research is aimed at a fundamental understanding of the atomic, electronic, and magnetic structure of materials and the effect of structure on the physical properties of materials. In FY 2000, measurements			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
of particular interest will include neutron and x-ray scattering from materials which exhibit complex phenomena resulting from competing interactions among the charge and spin of electrons and the crystalline lattice. New instruments and techniques to use neutron and x-ray beams will be developed. The level of support for this activity is determined by balance among all activities in condensed matter physics and by the availability of the neutron and x-ray beams to the scientific community and peer review of proposals. The enhancements of the High Flux Isotope Reactor and the Los Alamos Neutron Science Center, described later, will increase significantly the capacity for neutron scattering. In the long term, the Spallation Neutron Source will make a qualitative difference in the kinds of experiments that can be done. This activity will support increased research in neutron scattering to take advantage of the improved sources and to prepare for the Spallation Neutron Source. Capital equipment is provided for such items as detectors, monochromators, mirrors, and beamline instrumentation.	18,739	19,700	19,495
■ **Experimental Condensed Matter Physics:** This activity supports fundamental experimental research in condensed matter physics. This research includes measurements of the properties of solids, liquids, glasses, surfaces, thin films, artificially structured materials, self-organized structures, and nanoscale structures. This research is aimed at a fundamental understanding of the behavior of materials which underpins all DOE technologies. The materials examined include magnetic materials, superconductors, semiconductors and photovoltaics, liquid metals and alloys, and complex fluids. The measurements include optical and laser spectroscopy, electrical and thermal transport, thermodynamic and phase transition measurements, nuclear magnetic resonance, and scanning-tunneling and atomic-force microscopies. The development of new techniques and instruments including magnetic force microscopy, electron microscopic techniques, and innovative applications of laser spectroscopy are major			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
components of this activity. Measurements will be made under extreme conditions of temperature, pressure and magnetic field - especially with the availability of the 100 Tesla pulsed field magnet at LANL. The major efforts in FY 2000 will include continued support for investigations of materials with increasingly complex behavior, composition and structures with strongly competing interactions among the electronic charge and spin, and the crystalline lattice. A major new activity will be the synthesis and fabrication of unusual materials systems with pulsed laser ablation epitaxy, self-organized structures, and engineered materials and structures to provide insight into unusual behavior. Capital equipment is provided for items such as lasers, scanning tunneling microscopes, electron detectors for photoemission experiments, sample chambers, superconducting magnets and computers.	26,147	27,450	27,165
■ **Condensed Matter Theory, Particle-Solid Interactions, and Engineering Physics:** This activity supports basic research in theory and simulations, the use of ion beams to modify the properties of materials, and engineering applications. The theory activity complements much of the experimental work by guiding and stimulating experiments. The centers are group thrust areas in which individual scientists from widely different backgrounds work together to work on common research areas or making use of a common research facility. Included among these are the Center for X-ray Optics and the Center for Advanced Materials at LBNL and the Surface Modification and Characterization Facility at ORNL. Additionally, the design and construction of new, unique research instruments, such as the 100 Tesla Pulsed Field Magnet and the actinide photoelectron spectrometer at LANL, are supported in this activity. The emphasis in engineering physics is on the use of fundamental science to advance technology. Engineering physics includes activities			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
such as the application of sound waves for refrigeration; the fabrication of small, machined structures using x-rays; and the development of new, electron microscopy techniques such as the Z-contrast electron microscope at ORNL. This activity is science driven. Capital equipment is provided for items such as computer work stations, sample chambers, and high resolution electron microscopes. BES will provide opportunities for college faculty and students to spend time at DOE laboratories, to participate in world-class research projects. Faculty/Student Science Teams will visit our labs during the academic/summer semesters, be involved in conducting research, writing proposals, utilizing technology and pursuing technical or scientific careers. Primary goals of the Science Teams are to build long-term partnerships among DOE laboratories and provide faculty/students with a deeper understanding of DOE science associated needs for research and development. Funds will be provided to pay for faculty/student stipends, travel, housing, and subsidize laboratory scientists' time for this activity ($1,947,000).	19,553	20,555	22,341
■ **Materials Chemistry:** This activity supports basic research on the chemical properties of materials to understand the effect of chemical reactivity on the behavior of materials and to synthesize new chemical compounds and structures from which better materials can be made. The research is aimed at a fundamental understanding of the behavior of novel materials and structures. This activity includes research in solid state chemistry, surface chemistry, polymer chemistry, crystallography, synthetic chemistry, and colloid chemistry, which underpin technologies such as fuel cells, batteries, membranes, catalysis, electrochemistry, and solar energy conversion. This activity includes investigations of novel materials including low-dimensional, self-assembled monolayers; polymeric conductors; organic superconductors and magnets; complex fluids; and biomolecular materials. The research employs a wide variety of experimental techniques to characterize these materials including x-ray photoemission			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
and other spectroscopies, scanning tunneling and atomic force microscopies, nuclear magnetic resonance (NMR), and x-ray and neutron reflectometry. The activity also supports the development of new experimental techniques such as double rotation NMR, neutron reflectometry, and atomic force microscopy of liquids. Workshops on self-organized materials, electrode-electrolyte interfaces, catalysis, surface science and synchrotron x-ray micro-characterization have stimulated increased emphasis for these areas. Capital equipment is provided for such items as chambers to synthesize and grow new materials, nuclear magnetic resonance and electron spin resonance spectrometers, lasers, neutron reflectometers, x-ray beamlines, and atomic force microscopes.	23,547	24,715	24,458
■ **Experimental Program to Stimulate Competitive Research:** This activity supports basic research spanning the entire range of research supported by the Department in states that have historically received relatively less Federal research funding. The EPSCoR program supports research cluster activities at nine EPSCoR states through block grants and to individual investigator projects in all EPSCoR states and Puerto Rico. The EPSCoR states include Alabama, Arkansas, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, North Dakota, Oklahoma, South Carolina, South Dakota, Vermont, West Virginia, and Wyoming, and the Commonwealth of Puerto Rico. The work supported by the EPSCoR program includes research in organic semiconductors, membranes, photochemistry, synchrotron radiation and ion beams, tribology, thin film optoelectronics, catalysis, high energy particle physics, experimental nuclear physics, human genome research, desert vegetation, characterization of petroleum reservoirs, and wind and electrochemical power sources. In FY 2000, this program will include new work that will make use of the DOE National Laboratories and the world-class facilities at these labs. This program will be science-driven and will support the most meritorious proposals based on peer review. Workshops and discussions have been held with representative scientists from EPSCoR states to acquaint them with the facilities and personnel at the DOE Laboratories.	6,815	6,815	6,815

EPSCoR Distribution of Funds by State

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate
Alabama	800	825 [a]	75
Arkansas	50	100	100
Idaho	50	100	100
Kansas	50	91	95
Kentucky	800	650 [a]	200
Louisiana	814 [a]	152	146
Maine	150	750 [a]	0
Mississippi	0	50	50
Montana	800 [a]	75	75
Nevada	850	855 [a]	96
North Dakota	0	47	46
Oklahoma	0	100	100
Puerto Rico	800	800 [a]	50
South Carolina	250	800	800
South Dakota	50	50	50
Vermont	25	25	25
West Virginia	100	100	100
Wyoming	800	800	800
Other	426 [b]	445 [b]	3,907 [b]
Totals	6,815	6,815	6,815

[a] In FY 1998 the funding commitments for awards to the States of Louisiana and Montana expire. In FY 1999, the funding commitments to the States of Alabama, Kentucky, Maine, Nevada, and Puerto Rico will expire.

[b] Includes technical support for the Experimental Program to Stimulate Competitive Research (EPSCoR). Uncommitted funds in FY 2000 will be competed among all EPSCoR states that do not have active Research Implementation Awards to begin new Research Implementation Awards.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Los Alamos Neutron Science Center (LANSCE) instrumentation enhancement:** This project is a major item of equipment with a total estimated cost of $20,500,000 that will provide enhanced instrumentation at the LANSCE and will be implemented concurrently with an accelerator upgrade funded by the Office of Defense Programs.	4,500	4,500	6,000
■ **Extension of HB-2 beam tube at the High Flux Isotope Reactor:** This project, a major item of equipment with a total estimated cost of $5,900,000 will provide beam access for six thermal neutron scattering instruments. Beam guides and optimized geometry will provide a neutron flux at the instrument positions 2-3 times higher than currently available.	0	3,500	2,400
■ **Replacement of High Flux Isotope Reactor Monochrometer Drums.**	0	1,800	0
■ **Spallation Neutron Source (SNS):** Conceptual design of the Spallation Neutron Source (SNS) was completed in FY 1997. FY 1998 funding will support continued Pre-Title I research and development on the SNS. Beginning in FY 1999, SNS research funding in support of construction is reflected in the facility operations section of this budget.	23,000	0	0
■ **Climate Change Technology Initiative:** Basic research in carbon management for the Climate Change Technology Initiative will focus on three areas: high temperature materials, magnetic materials, and semiconductor materials. A major goal in a carbon management program is the derivation of materials that can withstand higher temperatures for more efficient combustion and for improved properties in applications. Research will focus on attaining an atomic-level understanding and a predictive capability for bulk metallic glasses, which have the potential to make significant contributions in corrosion and wear resistance in fossil fueled power plants, and on structural ceramics, which will be used in high temperature applications such as engine components. Additional work will focus on a fundamental understanding of the			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
surface physics and chemistry of oxide layers, which is expected to produce alloys and coatings that have improved corrosion resistance at high temperatures. A second goal is the derivation of magnetic materials to reduce energy loss during use. Research on the microstructure of permanent magnetic materials to understand the optimum grain structure is expected to result in stronger magnets, and research in the processing of magnetic materials is expected to optimize magnetic properties. Taken together, research in magnetic materials is critical to energy efficiency, since electric motors consume about two-thirds of U.S. electric power. A final goal in the areas of materials sciences is the development of new semiconductor materials for solar energy conversion stressing very innovative studies in nanoscale and mesoscale physics that might lead to breakthrough advances. The research will focus on improving the efficiency of the conversion of light to electricity. For example, research in the physics of quantum confinement might lead to new nanoscale structures that can be tuned to absorb the full spectrum of sunlight, which, when coupled to electron transport structures, would provide new ways to convert sunlight to electricity.	0	1,708	3,415
Total, Materials Sciences Research	195,752	187,793	188,342

Facilities Operations

- **Operation of National User Facilities:** The facilities included in Materials Sciences are: National Synchrotron Light Source, High Flux Beam Reactor (currently not operating), Intense Pulsed Neutron Source, Stanford Synchrotron Radiation Laboratory, Manuel Lujan, Jr. Neutron Scattering Center, High Flux Isotope Reactor, Advanced Light Source, and the Advanced Photon Source. Research and development in support of construction of the Spallation Neutron Source is also included. The facility operations budget request, which includes operating funds, capital equipment, and Accelerator and Reactor Improvements (AIP) funding under $5,000,000, is

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
provided in a consolidated manner later in this budget. AIP funding will support additions and modifications to accelerator and reactor facilities which are supported in the Materials Sciences subprogram. Included in the AIP funding are funds for the HFIR upgrade. Capital equipment is needed at the facilities for items such as beam monitors, interlock systems, vacuum systems, beamline front end components, monochromators, and power supplies. A summary of the funding for the facilities included in the Materials Sciences subprogram is provided below. Additional funds for facility operations for some of these facilities are included in the Chemical Sciences subprogram of this budget.	186,076	217,104	209,599

(dollars in thousands)

Facilities	FY 1998	FY 1999	FY 2000
National Synchrotron Light Source	23,047	24,094	24,523
High Flux Beam Reactor	22,986	22,568	22,580
Intense Pulsed Neutron Source	11,230	11,982	11,985
Stanford Synchrotron Radiation Laboratory	4,077	3,946	4,029
Manuel Lujan, Jr. Neutron Scattering Center	6,588	7,397	7,547
Advanced Light Source	30,708	31,166	31,732
Advanced Photon Source	82,368	86,226	87,703
Spallation Neutron Source	0	28,600	17,900
High Flux Isotope Reactor	3,972	0	1,600
Partial Offset to Science General Reduction Applied to BES	1,100	1,125	0
Total, Facilities	186,076	217,104	209,599

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SBIR/STTR Funding			
■ In FY 1998 $8,696,000 and $522,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs.	0	9,789	9,695
Total, Materials Sciences	381,828	414,686	407,636

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Materials Sciences Research	
■ Decrease in research for structure of materials.	-265
■ Decrease in research for mechanical behavior and radiation effects.	-165
■ Decrease in research for physical behavior.	-147
■ Decrease in research for engineering behavior	-220
■ Decrease in research for neutron and x-ray scattering.	-205
■ Decrease in research for experimental condensed matter physics.	-285
■ Decrease in materials research for condensed matter theory, particle-solid interactions, and engineering physics.	-161
■ Increase in funding will provide opportunities for college faculty and students to spend time at DOE laboratories to participate in world class research projects.	+1,947
■ Decrease in research for materials chemistry.	-257
■ Increase in capital equipment for LANSCE instruments	+1,500
■ Decrease in capital equipment funds for extension of HB-2 beam tube at HFIR for thermal neutron scattering because of completion of scheduled activities	-1,100
■ Decrease in capital equipment funds for monochromator drums on HB-1 and HB-3 because of completion of scheduled activities	-1,800
■ Increase support for Climate Change Technology Initiative.	+1,707
Total, Materials Sciences Research	+549

	FY 2000 vs. FY 1999 ($000)
Facilities Operations	
■ Decrease in SNS research and development funds because scheduled activities supporting construction are nearing completion	-10,700
■ Slight increase in support for the operation of major scientific user facilities.	+1,595
■ Increase in AIP funds for HB-4 beamline enclosure at HFIR.	+ 1,600
Total, Facilities Operations	-7,505
SBIR/STTR	
■ Decrease SBIR/STTR funding due to decrease in operating expenses.	-94
Total Funding Change, Materials Sciences	-7,050

Chemical Sciences

Mission Supporting Goals and Objectives

The Chemical Sciences subprogram has two major components. The disciplinary areas within each component are connected to and address needs of the principal DOE and BES mission goals and objectives. One major component is comprised of atomic, molecular and optical (AMO) physics; chemical physics; photochemistry; and radiation chemistry. This research provides a foundation for understanding fundamental interactions of atoms, molecules, and ions with photons and electrons. This work also underpins our fundamental understanding of chemical reactivity. This, in turn, enables the production of more efficient combustion systems with reduced emissions of pollutants. It also increases knowledge of solar photoconversion processes resulting in new, improved systems and production methods. Completely unanticipated benefits from this research often result. For example, research supported by the Chemical Sciences subprogram on small atomic clusters led to the discovery of the new forms of carbon named the fullerenes, typified by C_{60} (buckminsterfullerene). The 1996 Nobel Prize in chemistry was awarded to the scientists who made this discovery. The other major component of the research program is comprised of inorganic chemistry, organic chemistry, analytical chemistry, separations science, heavy element chemistry, and aspects of chemical engineering sciences. The research supported provides a better molecular level understanding of homogeneous and heterogeneous reactions occurring at surfaces, interfaces, and in bulk media. This has resulted in improvements to known heterogeneous and homogeneous catalytic systems and to new catalysts for the production of fuels and chemicals, better analytical methods in a wide variety of applications in energy processes and environmental sciences, new knowledge of actinide elements and separations important for environmental remediation and waste management, and better methods for describing turbulent combustion and predicting thermophysical properties of multicomponent systems.

Climate Change Technology Initiative. The chemical physics and photochemistry components of the research program provide the underlying chemical science needed to address carbon management. These areas enable more efficient combustion and new understanding of the photochemical conversion of CO_2 and the direct conversion of solar radiation to electricity. The component of the research program, comprised of separations science, physical chemistry and inorganic chemistry, provides the basis for new and improved catalysts for conversion of fuels to carbon dioxide and hydrogen, potentially for carbon dioxide conversion to chemicals, separation of the conversion components, and new electrochemical energy production and storage systems.

Scientific Simulation Initiative. This subprogram includes the Combusion Systems Integrated Applications component of DOE's Scientific Simulation Initiative (SSI), an integrated effort bringing together computational and communication resources, focused research in scientific disciplines, and research in computer science and other enabling technologies to solve the complex problems that characterize DOE's scientific research needs.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chemical Sciences Research	128,452	132,750	139,230	+6,480	+4.9%
Facilities Operations	67,675	68,928	71,430	+2,502	+3.6%
SBIR/STTR	0	4,672	4,917	+245	+5.2%
Congressional Direction	0	487	0	-487	-100.0%
Total, Chemical Sciences	196,127	206,837	215,577	+8,740	+4.2%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Chemical Sciences Research

- **Photochemistry and Radiation Research:**
  - The photochemistry research program investigates, at the molecular level, fundamental processes that capture and convert solar energy. Fundamental concepts of light-induced charge separation at the molecular level are developed for application to photodriven endothermic reactions for the conversion of light energy to chemical energy. In addition, photochemistry presents opportunities for altering chemical reaction pathways so that high volume industrial intermediates and specialty chemicals can be produced by less polluting processes. The program encompasses organic and inorganic photochemistry, electron and energy transfer in homogeneous and heterogeneous media, photocatalysis, and photoelectrochemistry. Naturally occurring photosynthetic reaction centers and antenna systems are studied as models of biomimetic/ photocatalytic assemblies that can carry out efficient photoinduced charge separation.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ Related to the photochemistry program but using different techniques is the radiation chemistry research program. This program supports research on the chemical effects produced by the absorption of energy from ionizing radiation. A major goal is to obtain molecular level information on chemical reactivity in solution, reactive transient intermediates, the kinetics and mechanisms of chemical reactions and processes at the solid/liquid interface. Frequently the studies are on systems that are not amenable to investigation by other techniques. Results from this research provide information on transients in solution and intermediates at liquid/solid interfaces for resolving important issues in solar photochemical energy conversion, environmental waste management and remediation; and intermediates relevant to nuclear energy production.			
▸ Recent workshops entitled "Research Opportunities in Photochemical Sciences" and "Research Needs and Opportunities in Radiation Chemistry" have helped identify issues for FY 2000 emphasis. These include: the fundamental mechanisms of inorganic and organic semiconductor electrode corrosion and passivation; improved theoretical models of heterogeneous electron and hole transfer across semiconductor interfaces; studies of the photophysics and chemistry of molecular excited states; control of the energetics of water splitting redox chemistry; and better understanding of the fundamental principles of photoinduced energy and charge transfer in natural and artificial photosystems as functions of structure, energetics, and medium.			
▸ Capital equipment is provided for such items as lasers, microscope scanners, liquid chromatographs, and temperature controllers.	24,907	23,927	22,982

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Chemical Physics Research:** This program investigates, at the molecular level, chemical reactions in the gas phase, at surfaces, and at interfaces and the relationship between molecular scale phenomena and bulk phenomena. Research activities involve closely-coupled experimental and theoretical efforts. Experimental projects include studies of molecular dynamics, chemical kinetics, spectroscopy, clusters, and surface science. The surface science and clusters research is aimed at providing predictive capability for surface mediated catalysis through provision of explanatory theories relating surface structure to surface mediated chemistry. One of the goals of the chemical physics program is to provide data and techniques for producing or predicting the values of chemical reaction rates to be included in combustion models for predicting the efficiency and emission characteristics of combustion devices and for optimization and control of combustion devices.	26,713	27,836	27,401
■ **Atomic, Molecular, and Optical (AMO) Science:**			
▸ This program supports theory and experiment to understand the interactions among atoms, molecules, ions, electrons, photons, and electromagnetic fields. This work provides the most basic underpinning of a broad spectrum of BES research activities including chemical reactivity, chemical physics, analytical techniques, materials sciences, and new instrumentation. It is this program that contributes knowledge at the most fundamental level necessary for science-based optimization of current energy sources and development of new ones. Furthermore, this program has produced our most detailed understanding of the interactions of particles with matter which enables us to understand the phenomena observed at the BES-supported synchrotron radiation light sources, the electron beam microcharacterization centers, and the neutron scattering facilities.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Furthermore, work in AMO science has produced measurement techniques and instrumentation that is widely used by other scientific disciplines and by industry and medical sciences.			
▸ A recent workshop entitled "Atomic, Molecular, and Optical Physics Workshop" has helped define areas of priority for BES for FY 2000 and beyond. That workshop was the first in a series of annual workshops that will link the BES-supported AMO science community with other scientific and technical communities. Program priorities include a detailed understanding of the interactions of photons, electrons, ions, and heavy particles with matter including a fundamental understanding of the interaction of optical electromagnetic fields with matter in the high field regime; novel states of matter induced by such interactions; and the control of matter by these light fields. Priority research also incudes studies of novel materials such as nanostructured materials, quantum dots, and artificial atoms; and heavy-ion and highly-charged ion collisions.			
▸ Capital equipment is provided for such items as pulse processing electronics, laser upgrades, position sensitive and solid state (SiLi) detectors.	9,926	10,200	10,213
■ **Catalysis and Chemical Transformations:**			
▸ This activity supports basic research related to chemical transformations and conversions that are fundamental to new or existing concepts of energy production and storage. The emphasis is on understanding the fundamental chemical principles underlying the new and developing technologies. Of particular interest are research activities with the objectives of understanding the chemical aspects of catalysis, both heterogeneous and homogeneous; the chemistry of fossil resources; the conversion of biomass and related cellulosic wastes; and the			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
chemistry of precursors to advanced materials. The disciplines of organic, organometallic, inorganic, physical, and thermochemistry are central to these programs.			
▸ Catalysts are crucial to energy conservation in creating new, less-energy-demanding routes for the production of basic chemical feedstocks and value-added products. The creation of new organometallic precursors has the potential of providing materials that are synthesized by less-energy-intensive processes than older materials that they replace or which function as energy-saving media themselves. These activities are linked with other catalyst related activities in BES in the materials chemistry and chemical physics programs; to other activities in the Department (Office of Heavy Vehicle Technology and the Office of Industrial Technology within EE, the Office of Fossil Energy, and the Office of International Development), and to programs at NSF.			
▸ For FY 2000, new opportunities identified through workshops and changing directions within this field of science are in aqueous catalytic chemistry, understanding the interface between water and catalytic oxides, and in catalytic activation and conversion of chlorofluorocarbons. Another area associated with the Climate Change Technology Initiative is the development of catalysts and catalytic processes for the transformation of carbon dioxide, i.e., the development of chemistry for new or improved CO_2 sequestration concepts.			
▸ Capital equipment is provided for such items as ultrahigh vacuum equipment, Fourier-transform infrared instrumentation, and high-field, solid-state NMR spectrometers.	21,883	23,401	22,854

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Separations and Analysis:**			
▸ The separations science activity supports basic research to improve our understanding of methods for separating mixtures of gases, liquids, solids, and their component molecules, cations, and anions. The program covers a broad spectrum of separations concepts, including membrane processes, extraction under both standard and supercritical conditions, adsorption, chromatography, photodissociation, and complexation. The research addresses the fundamental molecular level questions underlying the single most energy consuming of all industrial processes -- separations. The science has wide applicability and the potential for significant savings. There are strong links between this effort and the separations and analysis efforts in the Environmental Management Science Program.			
▸ The analysis activity supports research on phenomena basic to analytical methods with the goal of improving the sensitivity, reliability, and/or productivity of analytical determinations. Chemical and physical principles that can lead to entirely new methods of analysis are investigated; however, this program does not support instrument development. Rather, the program is aimed at obtaining a thorough understanding of the basic chemistry of analytical techniques so that their utility can be realized.			
▸ Several opportunities have been identified for FY 2000 that would provide the foundations needed to advance new technologies. These include advances in ceramic membranes, improved understanding of supercritical fluids for separations, applications of combinatorial chemistry to ligand design, reliable calibration methods for laser ablation sources, and improved understanding of surface-enhanced Raman spectroscopy.			
▸ Capital equipment is provided for such items as computational workstations and inductively-coupled plasma atomic emission spectrometers.	14,248	13,528	13,406

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Heavy Element Chemistry:**			
▸ This program focuses on the chemical and certain physical properties of the actinide elements, principally the transuranium elements. A variety of investigations are pursued, including organometallic chemistry, chemistry of excited spectroscopic states, thermochemistry of actinide elements and compounds, chemistry of actinides in near-neutral aqueous solutions, the reactions of aqueous actinide ions with various complexing agents, development of preparative methods for actinide metals, and compounds and characterization of actinides in the solid state under pressure. This research is performed principally at the national laboratories because of the special facilities required for handling radioactivity.			
▸ This program is the principal source of support in fundamental chemistry of the actinide elements for the Nation. The Department has assumed stewardship responsibilities for providing the Nation with basic knowledge of the chemistry of these elements because of their importance to nuclear technology and to the Department's efforts to remediate its former weapons production sites. There are strong links between this activity and the actinide chemistry efforts in the Environmental Management Science Program.			
▸ For FY 2000, new opportunities have been identified in the emerging areas of aqueous coordination chemistry, solid-state speciation and reactivity, and advanced theoretical methods for the prediction of electronic and molecular structure and reactivity.			
▸ Capital equipment is provided for such items as an x-ray diffractometer and equipment for a synchrotron light source end station.	6,239	6,862	6,774

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- **Chemical Energy and Chemical Engineering:**
  - This activity addresses energy aspects of chemically related engineering sciences, including thermodynamics, turbulence related to combustion, and physical and chemical rate processes. Particular attention is given to experimental and theoretical aspects of phase equilibria, especially of mixtures, including supercritical phenomena, and to the physics of gas phase turbulence. Also included are fundamental studies of thermophysical and thermochemical properties. Emphasis is given to improving and/or developing the scientific base for engineering generalizations and their unifying theories. Also included is fundamental research in areas critical to understanding the underlying limitations in the performance of non-automotive electrochemical energy storage systems. Areas of research include anode, cathode, and electrolyte systems and their interactions with emphasis on improvements in battery size, weight, life, and recharge cycles. The program covers a broad spectrum of research including fundamental studies of composite electrode structures, failure and degradation of active electrode materials, and thin film electrodes, electrolytes, and interfaces.
  - This activity provides support for those fundamental chemical engineering sciences that underpin nearly all energy intensive industrial chemical processes; particular emphasis is placed on electrochemical storage and turbulence both in combustion and in fluid flow where significant energy savings are possible. There are strong links with the combustion efforts in chemical physics and with other combustion efforts within the Department coordinated through the Combustion Coordinating Committee. The battery research efforts are coordinated with those in the Office of Transportation Technologies and the federal interagency battery consortium.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ For FY 2000 a new opportunity has been identified associated with the need to couple the current emphasis of the program in molecular simulations with molecular level theory.	8,044	8,869	8,448
■ **Climate Change Technology Initiative:** Basic research in carbon management will emphasize atomic and molecular level understanding of chemical processes to enable predictive capability. A major component of the research will aim at reducing emissions of carbon dioxide through fundamental understanding of the chemistries associated with combustion, catalysis, photochemical energy conversion, electrical energy storage, electrochemical interfaces, and molecular specific separation from complex mixtures. In particular, multidisciplinary efforts are required that focus on improved understanding of new and existing chemical and physical separation processes, transport mechanisms, and membrane systems with selective chemical functionality; this work will address issues that are critical to clean and efficient fuels in a reduced green-house-gas economy, such as separation of CO_2 from complex mixtures or new concepts for economical oxygen separation from air for partial oxidation schemes. In addition, work will be initiated using supercritical carbon dioxide as a reagent for the catalytic and photochemical reduction of carbon dioxide to specialty chemicals or hydrocarbons, thus preventing their release into the atmosphere. Examples of these activities are: understanding charge separation and electron transfer processes critical to photochemical reduction of carbon dioxide with water or hydrogen to hydrocarbons; understanding the interactions and dynamics between molecules and catalysts that result in new catalysts for carbon dioxide insertion into chemicals and understanding the complex relationship between chemical reaction dynamics and turbulence that are critical to improving the efficiency of fossil fuel combustion processes.	0	2,197	4,394

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Scientific Simulation Initiative, Combustion Simulation and Modeling:** This research effort, part of the overall DOE Scientific Simulation Initiative, will develop, through simulation and modeling, a deep and detailed understanding of combustion processes to accelerate the development, characterization, and validation of design tools for advanced combustion devices. Combustion processes are extraordinarily complex, consisting of hundreds of chemical reactions that comprise combustion chemistry, fluid dynamics with turbulence scales covering 6 orders of magnitude, and interactions between chemistry and fluid dynamics involving time and spatial scales that cover 12 orders of magnitude. To address this complexity, the problem will be broken into computational regimes: device scale, subgrid, and chemistry models. The chemistry models, using modern quantum mechanical computational methods, will calculate the rates of component, combustion reactions that cannot be measured. The subgrid models incorporate the detailed interaction of chemistry with fluid dynamics at a scale that is independent of the combustion device and provide data on material and energy balance required by the device scale models. The device scale model completes the simulation, incorporating the results and parameters supplied by the other two regimes into a description of the overall device performance. Models for each of the three regimes can and will be developed concurrently and interactively. The fundamental physical laws that govern combustion behavior are known. Computational codes that can take advantage of parallel computer architectures are already under development for each of the three regimes. Provision of sufficient fidelity in the prediction of combustion device performance, particularly the emission characteristics of combustion devices, will require computational resources of the scale being planned for the overall Scientific Simulation Initiative. The knowledge gained will be used by the combustion engineering community to develop design and optimization codes for new combustion devices.	0	0	6,828

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **General Plant Project (GPP):** GPP funding is for minor new construction, for other capital alterations and additions, and for improvements to land, buildings, and utility systems principally at the Ames Laboratory, Argonne National Laboratory, and Oak Ridge National Laboratory as part of the Basic Energy Sciences landlord responsibilities for these laboratories. Funding of this type is essential for maintaining the productivity and usefulness of the Department-owned facilities and in meeting its requirement for safe and reliable facilities operation. Additional GPP funding is included in the Facilities Operations justification. The total estimated cost of each GPP project will not exceed $5,000,000.	9,992	10,275	10,275
■ **General Purpose Equipment (GPE):** GPE funding is provided for Ames Laboratory, Argonne National Laboratory, and Oak Ridge National Laboratory as part of the Basic Energy Sciences responsibilities for these laboratories for general purpose equipment that supports multipurpose research.	6,500	5,655	5,655
Subtotal, Chemical Sciences Research	128,452	132,750	139,230

Facilities Operations

■ **Facilities Operations:** The facilities included in Chemical Sciences are: National Synchrotron Light Source, High Flux Isotope Reactor, Radiochemical Engineering Development Center, Stanford Synchrotron Radiation Laboratory, and Combustion Research Facility. The facility operations budget request, which includes operating funds, capital equipment, general plant projects, and AIP funding under $5,000,000, is described in a consolidated manner later in this budget. A summary table of the facilities included in this Chemical Sciences subprogram is provided below. Additional funds for facility operations for some of these facilities are included in the Materials Sciences subprogram of this budget.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Included in FY 2000 is the third and final major increment to the HFIR operating budget of $5,979,000 for the replacement of the beryllium reflector. The reflector replacement includes fabrication of the new reflector, disassembly and reassembly of the reactor and beam room, and associated safety and engineering activities. Reflector replacement, which began in FY 1998 and will be completed in FY 2000, is a recurring activity that must be performed every 10-12 years. AIP funding will support additions and modifications to accelerator and reactor facilities, which are supported in the Chemical Sciences subprogram. General Plant Project (GPP) funding is also required for minor new construction, for other capital alterations and additions, and for improvements to land, buildings, and utility systems. The total estimated cost of each GPP project will not exceed $5,000,000. Capital equipment is needed for the facilities for items such as beam monitors, interlock systems, vacuum systems, beamline front end components, monochromators, and power supplies.	67,675	68,928	71,430

	(dollars in thousands)		
Facilities	FY 1998	FY 1999	FY 2000
National Synchrotron Light Source	7,949	8,082	8,233
High Flux Isotope Reactor	29,798	29,659	32,974
Radiochemical Engineering Development Center	6,705	7,027	7,168
Stanford Synchrotron Radiation Laboratory	17,607	18,740	17,939
Combustion Research Facility	5,161	5,024	5,116
Partial Offset to Science General Reduction Applied to BES	455	396	0
Total, Facilities	67,675	68,928	71,430

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SBIR/STTR Funding			
■ In FY 1998 $4,270,000 and $256,000 were transferred to the SBIR and STTR programs, respectively. In FY 1999 and FY 2000 the amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs.	0	4,672	4,917
Congressional Direction			
■ Funds research related to identification of trace element isotopes in environmental samples at the University of Nevada - Las Vegas (per Congressional Direction).	0	- 487	0
Total, Chemical Sciences	196,127	206,837	215,577

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Chemical Sciences Research	
■ Decrease in research for photochemistry and radiation research.	-945
■ Decrease in research for chemical physics.	-435
■ No change in atomic, molecular and optical sciences research	+13
■ Decrease in research for catalysis and chemical transformations	-547
■ Decrease in research for separations and analysis	-122
■ Decrease in research for heavy element chemistry	-88
■ Decrease in research for chemical energy and chemical engineering	-421

	FY 2000 vs. FY 1999 ($000)
■ Increase support for the Climate Change Technology Initiative.	+2,197
■ Initiate the Combustion Simulation and Modeling Research effort as part of the overall DOE Scientific Simulation Initiative.	+6,828
Total, Chemical Sciences Research	+6,480
Facilities Operations	
■ Provide increase for scientific facilities, except for the beamline at SSRL that was completed in FY 1999. Also includes support of the beryllium reflector replacement at HFIR	+2,502
SBIR/STTR	
■ Increase SBIR/STTR funding due to increase in operating expenses	+245
Congressional Direction	
■ Funding completed on Congressionally directed project..	-487
Total Funding Change, Chemical Sciences	+8,740

Engineering and Geosciences

Mission Supporting Goals and Objectives

The Engineering and Geosciences subprogram conducts research in two disciplinary areas, engineering and geosciences. In Engineering Research, the goals are to extend the body of knowledge underlying current engineering practice to create new options for improving energy efficiency and to broaden the technical and conceptual knowledge base for solving the engineering problems of energy technologies. In Geosciences Research, the goal is on fundamental knowledge of the processes that transport, concentrate, emplace, and modify the energy and mineral resources and the byproducts of energy production. The research supports existing energy technologies and strengthens the foundation for the development of future energy technologies. Ultimately the research impacts control of industrial processes to improve efficiency and reduce pollution, to increase energy supplies, and to lower cost and increase the effectiveness environmental remediation of polluted sites.

Climate Change Technology Initiative. The Geosciences Research Program will enhance the scientific underpinning necessary for improving the characterization of subsurface formations and their host potential for carbon dioxide sequestration. Geomechanical studies and research on rock-fluid interactions will support evaluations of carbon dioxide injection technologies, reservoir storage capacities, and long-term storage stability. Research concerning the physics of flow for multiple reactive fluid phases in fractured rock systems will provide the basis for predicting the viability of terrestrial carbon dioxide sequestration and for improved efficiency of fossil energy and geothermal energy production. Additional research in geochemistry will complement the research activities in geophysics with investigations to enhance understanding of the geochemical reactivity within the reservoirs/aquifers under static and dynamic flow conditions for fluids enriched in constituents important for CO_2 sequestration.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Engineering Research	17,296	17,471	14,500	-2,971	-17.0%
Geosciences Research	22,855	24,189	22,097	-2,092	-8.6%
SBIR/STTR	0	1,079	948	-131	-12.1%
Total, Engineering and Geosciences	40,151	42,739	37,545	-5,194	-12.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Engineering Research			
■ **Engineering Research:** The Engineering Research activity supports work in three technical areas: (1) mechanical systems including fluid mechanics, heat transfer, and solid mechanics; (2) systems sciences including process control, instrumentation, and intelligent machines and systems; and (3) engineering analysis including nonlinear dynamics, data bases for thermophysical properties, models of combustion processes for engineering applications and foundation of bioprocessing of fuels, and energy related waste and materials. In FY 2000, funding will be terminated for research in turbulence, control systems, integrated manufacturing, and combustion. Research will be decreased in fluid dynamics and flow through porous research in bodies.	17,296	17,471	14,500
Geosciences Research			
■ **Geosciences Research:** The Geosciences Research activity supports basic research in geophysics and geochemistry to improve the level of understanding necessary for advances in and choices among current and emerging energy and environmental technologies. Geochemical research focuses on fundamental understanding of mineral-fluid interactions to provide a better foundation for oil, gas, and geothermal resource recovery and control of contaminants in groundwater flow; new fundamental thermodynamic and physical property information on rocks, minerals, and geologic fluids for resource recovery and contaminant assessment and monitoring; and extending the applicability of isotopic tracer methods for evaluation of natural and human-perturbed processes in the geologic environment. This information, in concert with other geosciences research, is providing the basis for efforts leading to quantitative predictive capabilities for processes that take place in the			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Earth's crust. In FY 2000, funding will be terminated on mechanical stability of porous reservoirs and multi-phase flow through porous bodies. Funding will be reduced in geochemistry and geophysics.	22,855	22,725	15,275
■ **Climate Change Technology Initiative:** Basic research in carbon management for the Climate Change Technology Initiative will emphasize those aspects of geosciences and engineering that will provide the understanding needed for sequestration of carbon dioxide in subsurface reservoirs. The research program will focus on three areas where improved understanding is needed to evaluate the potential for deep underground sequestration: (1) understanding the mechanical stability of porous and fractured reservoirs/aquifers during injection and over the long times required for sequestration; (2) understanding flow of fluids with multiple phases within the aquifers; and (3) understanding the geochemical reactivity within and among fluids, and between fluids and rock material within the reservoirs/aquifers. In order to understand the mechanical stability of formations, a better understanding of the stress-strain-poroelasticity- viscoelasticity-thermoelasticity constitutive relationships are necessary, as are fracture mechanics models, improved seismic models, and inversion codes to track mechanical stability of rocks at reservoir depths and scales. Fluid flow studies are need to understand mixing, fingering and phase retardation, fluid-fluid transport at ambient and injection conditions, fluid-fluid-mineral interactions including wetting behavior, and surface tension effects. In order to understand the mechanical stability of potential storage formations, a better understanding of the geochemical reactivity of reservoirs/aquifers -- under conditions involving fluids rich in constituents important for CO_2 sequestration and in the presence of interacting mineral-fluid system -- will be needed to fully evaluate these systems in terms of sequestration potential and safety.	0	1,464	6,822
Total, Geosciences Research	22,855	24,189	22,097

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SBIR/STTR Funding			
■ In FY 1998 $984,000 and $59,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs.	0	1,079	948
Total, Engineering and Geosciences	40,151	42,739	37,545

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Engineering Research	
■ Termination of engineering research on turbulence, control systems, integrated manufacturing, and combustion and decrease in research on fluid dynamics.	-2,971
Geosciences Research	
■ Termination of geosciences research on mechanical stability of porous reservoirs and multi-phase flow through porous bodies and decrease in geochemistry and geophysics to provide increase in Climate Change Technology Initiative and other priority areas.	-7,450
■ Increase in Climate Change Technology Initiative.	+5,358
Total, Geosciences Research	-2,092
SBIR/STTR	
■ Decrease SBIR/STTR funding due to increase in operating expenses.	-131
Total Funding Change, Engineering and Geosciences	-5,194

Energy Biosciences

Mission Supporting Goals and Objectives

The Energy Biosciences subprogram supports mechanistic research on fundamental biological processes related to capture, transformation, storage and utilization of energy. The research focuses on plants and non-medical microorganisms to form a broad scientific foundation for support of Department of Energy's goals and objectives in energy production, environmental management, and energy conservation. Basic research on plants includes photosynthetic mechanisms and bioenergetics in algae, higher plants, and photosynthetic bacteria; control mechanisms that regulate plant growth and development; fundamental aspects of gene structure, function, and expression; plant cell wall structure, function and synthesis; and mechanisms of transport across membranes. Research supported in these areas seeks to define and understand the biological mechanisms that effectively transduce light energy into chemical energy, to identify the biochemical pathways and genetic regulatory mechanisms that can lead the efficient biosynthesis of potential fuels and petroleum-replacing compounds, and to elucidate the capacity of plants to remediate contaminated environments by transporting and detoxifying toxic substances. The research focus in the microbiological sciences includes the degradation of biopolymers such as lignin and cellulose, anaerobic fermentations, genetic regulation of microbial growth and development, thermophily, e.g., bacterial growth under high temperature, and other phenomena with the potential to impact biological energy production, conversion and conservation. Organisms and processes that offer unique possibilities for research at the interface of biology and the physical, earth and engineering sciences are also studied.

Climate Change Technology Initiative. Biological systems, particularly plants, algae, and microbes, play a major role in the capture and release of atmospheric carbon dioxide. Photosynthetic organisms use sunlight to convert carbon dioxide into more complex organic compounds, while many non-photosynthetic organisms use the energy in various inorganic and organic compounds to fix carbon dioxide. The biological processes of carbon dioxide fixation offer numerous possibilities leading to the reduction of atmospheric carbon dioxide levels by replacing fossil-derived fuels with renewable resources or providing fixed carbon for long-term sequestration.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Energy Biosciences	26,710	29,088	30,410	+1,322	+4.5%
SBIR/STTR	0	774	816	+42	+5.4%
Total, Energy Biosciences	26,710	29,862	31,226	+1,364	+4.6%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Energy Biosciences

- **Energy Biosciences**: This activity supports basic research in the energy-related biosciences forming the mechanistic foundation for the development of future biotechnologies related to energy. This work provides the knowledge necessary to use biological systems associated with the capture, transformation, storage and utilization of energy, and other significant missions of the Department of Energy. Those programs within the Department that are active in creating or exploiting technologies are supported through numerous interactions at both the manager and the researcher level. The Basic Energy Sciences program is scientifically heterogeneous and many efforts are made to encourage the development of truly interdisciplinary research activities. The Energy Biosciences subprogram is actively involved with other federal agencies funding basic plant and microbial research to encourage effective and efficient management of the total federal research portfolio.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The successes of this subprogram, along with other federal research efforts, are developing an expanding science knowledge base leading to the rapid expansion of biotechnological applications using both plants and microbes. The formation of numerous large "life science" corporations is indicative of this trend. Ongoing basic research is leading to numerous new and unexploited research opportunities, including functional plant genomics, organellar and chromosome-level bioengineering, elucidation of new biochemistries, and determiantion of cellular and morphological development. Each of these areas have the potential to be commercially applied, resulting in major economic and societal impacts ranging from the revitalization of the rural economy through dispersal of the nation's manufacturing base to the formation of a new generation of bio-based industries; in addition to having a major impact on the nation's production and use of energy expensive chemicals and fuels. Recently, private and charitable research foundations have responded to both the opportunities and impacts of fundamental research in these areas and are building large basic research institutes in St. Louis and San Diego. They have the resources to build the needed facilities, but are relying on the federal government to provide the long-term support of the research activities and to provide the required scientific personnel. Capital Equipment is provided for items used for structure determination and for special analysis of biomaterials.	26,710	26,652	25,537

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Climate Change Technology Initiative:** Basic research in carbon management for the Climate Change Technology Initiative begun in FY 1999 emphasized the biological process of photosynthesis, which is central to global carbon cycling. The primary current focus of these photosynthesis activities is the biophysics and biochemistry of energy capture and structural studies on the photosynthetic apparatus. There are a number of unexplored opportunities that complement this work with studies on the mechanism of photosynthetic carbon fixation and the subsequent metabolism of the fixed carbon. An example of the research supported are studies to provide a fundamental understanding of chloroplasts, which are small membrane bound entities in the cytoplasm of plant cells where photosynthesis occurs. Chloroplasts contain DNA and are able to control their development and replication. The new research will investigate the principals underlying the biochemical and molecular genetic mechanisms of chloroplast development and reproduction along with critical interactions of chloroplasts with the cytoplasm and nucleus. The understanding obtained from these and related studies will permit the production of radical changes in photosynthetic carbon capture by manipulating both the efficacy of the photosynthetic apparatus and its function in whole plants.	0	2,436	4,873
Total, Energy Biosciences	26,710	29,088	30,410
SBIR/STTR Funding			
■ In FY 1998 $672,000 and $40,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of the SBIR/STTR programs.	0	774	816
Total, Energy Biosciences	26,710	29,862	31,226

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Energy Biosciences	
■ Decrease in support of research providing the fundamental understanding of life processes in plant and microbes.	-1,115
■ Increase in support for Climate Change Technology Initiative.	+2,437
Total, Energy Biosciences	+1,322
SBIR/STTR	
■ Increase in SBIR/STTR funding due to increase in operating expenses.	+42
Total Funding Change, Energy Biosciences	+1,364

Construction

Mission Supporting Goals and Objectives

Construction is needed to support the research in each of the subprograms in the Basic Energy Sciences program. Experiments necessary in support of basic research require that state-of-the-art facilities be built or existing facilities modified to meet unique research requirements. Reactors, radiation sources, and neutron sources are among the expensive, but necessary, facilities required. The budget for the BES program includes funding for the construction and modification of these facilities.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Construction	7,000	105,400	196,100	+90,700	+86.0%
Total, Construction	7,000	105,400	196,100	+90,700	+86.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Construction			
■ Funding for the Combustion Research Facility, Phase II was completed in FY 1999 as scheduled.	7,000	4,000	0
■ The FY 2000 requested budget authority will provide for: continuation of Title I design, the start of Title II design activities, initiation of construction of conventional facilities, procurement of several significant technical components, and continued research and development activities for the Spallation Neutron Source.	0	101,400	196,100
Total, Construction	7,000	105,400	196,100

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Construction	
■ The decrease in funding for the construction of the Combustion Research Facility, Phase II project is a result of the scheduled completion of this project .	-4,000
■ The increase in funding for the Spallation Neutron Source represents the scheduled ramp up of activities.	+94,700
Total Funding Change, Construction	+90,700

Major User Facilities

Mission Supporting Goals and Objectives

The BES scientific user facilities provide experimental capabilities that are beyond the scope of those found in laboratories of individual investigators. Synchrotron radiation light sources, high-flux neutron sources, electron beam microcharacterization centers, and other specialized facilities enable scientists to carry out experiments that could not be done elsewhere. These facilities are part of the Department's system of scientific user facilities, the largest of its kind in the world. A description of each facility is provided in the "Site Descriptions" section. Any unusual or nonrecurring aspects of funding are described in the following section "Detailed Program Justification."

The facilities are planned in collaboration with the scientific community and are constructed and operated by BES for support of forefront research in areas important to BES activities and also in areas that extend beyond the scope of BES activities such as structural biology, medical imaging, and micro machining. These facilities are used by researchers in materials sciences, chemical sciences, earth and geosciences, environmental sciences, structural biology, superconductor technology, and medical research and technology development. The facilities are open to all qualified scientists from academia, industry, and the federal laboratory system whose intention is to publish in the open literature. The funding schedule includes only those facilities that have operating budgets for personnel, utilities, and maintenance.

Funding Schedule

Funding for operation of these facilities is provided in the Materials Sciences and Chemical Sciences subprograms.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
National Synchrotron Light Source	30,996	32,176	32,756	+580	+1.8%
High Flux Beam Reactor	22,986	22,568	22,580	+12	+0.1%
Intense Pulsed Neutron Source	11,230	11,982	11,985	+3	0.0%
High Flux Isotope Reactor	33,770	29,659	34,574	+4,915	+16.6%
Radiochemical Engineering Development Center	6,705	7,027	7,168	+141	+2.0%
Stanford Synchrotron Radiation Laboratory	21,684	22,686	21,968	-718	-3.2%
Manuel Lujan, Jr. Neutron Scattering Center	6,588	7,397	7,547	+150	+2.0%
Combustion Research Facility	5,161	5,024	5,116	+92	+1.8%
Advanced Light Source	30,708	31,166	31,732	+566	+1.8%
Advanced Photon Source	82,368	86,226	87,703	+1,477	+1.7%
Spallation Neutron Source	0	28,600	17,900	-10,700	-37.4%
Partial Offset to Science General Reduction Applied to BES	1,555	1,521	0	-1,521	-100.0%
Total, Major User Facilities	253,751	286,032	281,029	-5,003	-1.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Facilities Operations			
■ National Synchrotron Light Source at Brookhaven National Laboratory	30,996	32,176	32,756

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ High Flux Beam Reactor at Brookhaven National Laboratory. On December 21, 1996, the High Flux Beam Reactor (HFBR) was shut down for normal refueling. However, before the reactor was restarted, the announcement was made that a plume of tritium, believed to emanate from the reactor spent fuel pool, was contaminating the ground water south of the reactor. The reactor has remained in standby mode since that time. Because the reactor contains radioactive fluids in the primary cooling system, nearly a full staff is necessary to maintain the reactor and associated equipment in safe operating condition. The funding requested in FY 2000 represents that required to maintain the reactor and to proceed with safety modifications that are required regardless of whether the reactor is restarted or is decommissioned.	22,986	22,568	22,580
■ Intense Pulsed Neutron Source at Argonne National Laboratory.	11,230	11,982	11,985
■ High Flux Isotope Reactor at Oak Ridge National Laboratory. There will be a continuation of increased operating support in FY 2000 to take advantage of the new cold source with 3 new experimental stations and to support the scheduled replacement of the beryllium reflector. Also, includes AIP funding of $3,972,000 in FY 1998 for HB-2 tube upgrades and $1,600,000 in FY 2000 for HB-4 Beamline Enclosure.	33,770	29,659	34,574
■ Radiochemical Engineering Development Center at Oak Ridge National Laboratory.	6,705	7,027	7,168
■ Stanford Synchrotron Radiation Laboratory at Stanford University. The decrease is the result of scheduled completion of Beamline 11.	21,684	22,686	21,968
■ Manuel Lujan, Jr. Neutron Scattering Center at Los Alamos National Laboratory.	6,588	7,397	7,547
■ Combustion Research Facility at Sandia National Laboratories/California.	5,161	5,024	5,116

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Advanced Light Source at Lawrence Berkeley National Laboratory.	30,708	31,166	31,732
■ Advanced Photon Source at Argonne National Laboratory.	82,368	86,226	87,703
■ Spallation Neuron Source.	0	28,600	17,900
■ Partial Offset to ESRD General Reduction Applied to BES.	1,555	1,521	0
Total, Major User Facilities	253,751	286,032	281,029

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	10,342	10,625	10,625	0	0.0%
Accelerator Improvement Projects	11,502	7,108	8,195	+1,087	+15.3%
Capital Equipment	49,809	57,114	55,178	-1,936	-3.4%
Total, Capital Operating Expenses	71,653	74,847	73,998	-849	-1.1%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
99-E-334 Spallation Neutron Source, ORNL	1,159,500	0	0	101,400	196,100	862,000
96-E-300 Combustion Research Facility, Phase II, SNL	26,800	15,800	7,000	4,000	0	0
Total, Construction		15,800	7,000	105,400	196,100	862,000

Major Items of Equipment (*TEC $2 million or greater*)

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
Short Pulse Spallation Upgrade at LANSCE - LANL	20,500	0	4,500	4,500	6,000	FY 2001
HB-2 Beam Tube Extension at HFIR - ORNL	5,900	0	0	3,500	2,400	FY 2000
Total, Major Items of Equipment		0	4,500	8,000	8,400	

99-E-334 — Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, Tennessee

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line in the left margin.)

Significant Changes

The Total Estimated Cost and Total Project Cost have been increased and the construction schedule has been extended. The schedule delay and increased costs are a result of the planned FY 1999 funding being reduced by $27,000,000 in the FY 1999 appropriation.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	4Q 2003	3Q 2000	4Q 2005	1,138,800	1,332,800
FY 2000 Budget Request (*Current Estimate*)	1Q 1999	4Q 2003	3Q 2000	1Q 2006	1,159,500	1,360,000

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Construction			
1999	101,400	101,400	53,700
2000	196,100	196,100	166,200
2001	267,900	267,900	263,800
2002	262,500	262,500	274,100
2003	193,600	193,600	207,300
2004	78,300	78,300	131,700
2005	49,200	49,200	47,200
2006	10,500	10,500	15,500

3. Project Description, Justification and Scope

The purpose of the Spallation Neutron Source (SNS) Project is to provide a next-generation short-pulse spallation neutron source for neutron scattering and related research in broad areas of the physical, chemical, materials, biological, and medical sciences. The SNS will be a national facility with an open user policy attractive to scientists from universities, industries, and federal laboratories. It is anticipated that the facility will be used by 1,000—2,000 scientists and engineers each year and that it will meet the national need for neutron science capabilities well into the next century.

The importance of neutron science for fundamental discoveries and technological development is universally acknowledged. The scientific justification and need for a new neutron source and instrumentation in the U.S. have been thoroughly established by numerous studies by the scientific community since the 1970s. These include the 1984 National Research Council study *Major Facilities for Materials Research and Related Disciplines* (the Seitz-Eastman Report), which recommended the immediate start of the design of both a steady-state source and an accelerator-based pulsed spallation source. More recently, the 1993 DOE Basic Energy Sciences Advisory Committee (BESAC) report *Neutron Sources for America's Future* (the Kohn Panel Report) again included construction of a new pulsed spallation source with SNS capabilities among its highest priorities. This conclusion was even more strongly reaffirmed by the 1996 BESAC Report (the Russell Panel Report), which recommended the construction of a 1 megawatt (MW) spallation source that could be upgraded to significantly higher powers in the future.

Neutron probes are a unique and increasingly indispensable scientific tool. Over the past decade, they have made invaluable contributions to the understanding and development of many classes of new materials, from high temperature superconductors to fullerenes, a new form of carbon. In addition to creating the new scientific knowledge upon which unforeseen breakthroughs will be based, neutron science is at the core of many technologies that currently improve the health of our citizenry and the safety and effectiveness of our industrial materials.

The information that neutrons provide has wide impacts. For example, chemical companies use neutrons to make better fibers, plastics, and catalysts; drug companies use neutrons to design drugs with higher potency and fewer side effects; and automobile manufacturers use the penetrating power of neutrons to understand how to cast and forge gears and brake discs in order to make cars run better and more safely. Furthermore, research on magnetism using neutrons has led to higher strength magnets for more efficient electric generators and motors and to better magnetic materials for magnetic recording tapes and computer hard drives.

Based on the recommendations of the scientific community obtained via the 1996 Russell Panel Report, the SNS has been designed to operate at an average power on target of about 1 MW. At this power level, the SNS will be the most powerful spallation source in the world--six times that of ISIS at the Rutherford Appleton Laboratory in the United Kingdom. However, the SNS has been deliberately designed to allow for economical upgrading to substantially higher powers once the technology is developed to make this possible. Thus, the SNS will be the nation's premiere neutron facility for many decades.

The importance of high power, and consequently high neutron flux (i.e., high neutron intensity), cannot be overstated. The properties of neutrons that make them an ideal probe of matter also require that they

be generated with high flux. (Neutrons are particles with the mass of the proton, with spin 1/2, and with no electrical charge.) Neutrons interact with nuclei and magnetic fields; both interactions are extremely weak, but they are known with great accuracy. Because they weakly interact with materials, neutrons are highly penetrating and can be used to study bulk phase samples, highly complex samples, and samples confined in thick-walled metal containers. Because they have spin, neutrons have a magnetic moment and can be used to study magnetic structure and magnetic properties of materials. Because their interactions are known with great accuracy, neutron scattering is far more easily interpreted than either photon scattering or electron scattering.

However, the same properties that make neutrons an ideal probe of matter also result in their most significant disadvantage. Because neutrons interact only weakly with matter, most neutrons pass through a sample without producing a detectable interaction. Therefore, neutron scattering experiments are said to be extremely "flux limited." This situation is further exacerbated because, unlike photons and charged particles, neutrons cannot be focused. Therefore, high brilliance (i.e., highly focused) neutron beams are very difficult to make. The combination of weak interaction and inherent low brilliance has driven the quest for high-flux neutron sources. The pursuit of high-flux neutron sources is more than just a desire to perform experiments faster, although that, of course, is an obvious benefit. High flux enables broad classes of experiments that cannot be done with low-flux sources. For example, high flux enables studies of small samples, complex molecules and structures, time-dependent phenomena, and very weak interactions. Put most simply, high flux enables studies of complex materials in real time and in all disciplines--physics, chemistry, materials science, geosciences, and biological and medical sciences.

The SNS will consist of a linac-ring accelerator system that delivers short (microsecond) pulses to a target/moderator system where neutrons are produced by a nuclear reaction process called spallation. The process of neutron production in the SNS consists of the following: negatively charged hydrogen ions are produced in an ion source and are accelerated to 1 giga electron volt (GeV) energy in a linear accelerator (linac); the hydrogen ion beam is injected into an accumulator ring through a stripper foil, which strips the electrons off of the hydrogen ions to produce a proton beam; the proton beam is collected and bunched into short pulses in the accumulator ring; and, finally, the proton beam is injected into a heavy metal target at a frequency of up to 60 Hz. The intense proton bursts striking the target produce pulsed neutron beams by the spallation process. The high-energy neutrons so produced are moderated (i.e., slowed down) to reduce their energies, typically by using thermal or cold moderators. The "moderated" neutron beams are then used for neutron scattering experiments. Specially designed scientific instruments use these pulsed neutron beams for a wide variety of investigations.

The primary objectives in the design of the site and buildings for the SNS are to provide optimal facilities for the DOE and the scientific community for neutron scattering well into the next century and to address the mix of needs associated with the user community, the operations staff, security, contamination control, noise, etc.

A research and development program is required to ensure technical feasibility and to determine physics design of accelerator and target systems that will meet performance requirements.

The objectives stated above will be met by the technical components described earlier (ion source; linac accelerator; accumulator ring; target station with moderators; beam transport systems; and experimental facilities capable of supporting up to 18 neutron scattering beam lines for research instruments) and attendant conventional facilities. Also included on the site will be facilities to support the needs of

operations staff, technical support staff, users and capabilities for remote servicing of activated components. An initial suite of approximately 10 neutron scattering instruments is included in the TEC.

The FY 1999 budget authority allowed the start of Title I design activities, initiation of subcontracts and long-lead procurements, and continuation of critical research and development work necessary to reduce technical and schedule risks in this project. Initiation of most long-lead procurements is delayed until FY 2000 due to the reduction in the FY 1999 appropriation.

FY 2000 funding of $214,000,000 is requested for the SNS Project for detailed design (Title II) for the ion source, low-energy beam transport, linac structure and magnet systems, target assemblies, experimental instruments, and global control systems. Detailed design will be completed for several conventional facilities in preparation for the installation of major equipment in the following fiscal year; design will be completed on the front-end building, linac tunnel, high-energy beam transport tunnel, ring-service building, ring-to-beam transport tunnel, and the klystron hall. Construction will start for some conventional facilities including roads into the site, site preparation/grading, waste systems, and retention basins. Procurement for several significant equipment items such as dipole magnets, material for the target transport systems, and klystrons will begin. Project Management and Project Integration activities, which are exceptionally important during this phase of the project, will also be conducted. The Preliminary Safety Analysis Report (PSAR) will be completed during the fiscal year and work will begin on the final report.

4. Details of Cost Estimate [a]

	(dollars in thousands) Current Estimate	Previous Estimate
Design and Management Costs		
Engineering, design and inspection at approximately 26% of construction costs	166,900	166,900
Construction management at approximately 4% of construction costs	26,300	26,300
Project management at approximately 15% of construction costs	102,900	96,800
Land and land rights	0	0
Construction Costs		
Improvements to land (grading, paving, landscaping, and sidewalks)	28,600	28,600
Buildings	176,700	176,700
Other structures	600	600
Utilities (electrical, water, steam, and sewer lines)	30,500	30,500
Technical Components	417,900	406,300
Standard Equipment	1,100	1,100
Major computer items	12,000	12,000
Removal cost less salvage	0	0
Design and project liason, testing, checkout and acceptance	9,700	6,700
Subtotal	973,200	952,500
Contingencies at approximately 19 percent of above costs	186,300	186,300
Total Line Item Cost	1,159,500	1,138,800
Less: Non-Agency Contribution	0	0
Total, Line Item Costs (TEC)	1,159,500	1,138,800

5. Method of Performance

The ORNL Management and Operating Contractor will provide overall project management and integration, design and ultimate procurement of the target station, beam transport, and experiment systems, and will subcontract for the services of an Industry Team for design and construction management services. The Industry Team will consist of an Architect-Engineer for the conventional facilities design and a Construction Manager for construction, installation, equipment procurement, testing and preoperational support. Other DOE laboratories will, through intra laboratory agreements, become members of the overall project's management, design and R&D team, particularly in the areas encompassed by the linac, the accumulator ring, instrumentation, and the target. Procurement and

a The cost estimate is based on a conceptual design completed in FY 1997. The DOE Headquarters Economic Escalation indices were used as appropriate over the project cycle.

construction will be accomplished, to the extent feasible, by fixed-priced subcontracts awarded to industry on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Year Costs	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost[a]						
Line Item TEC	0	0	53,700	166,200	939,600	1,159,500
Plant Engineering & Design	0	0	0	0	0	0
Expense-funded equipment	0	0	0	0	0	0
Inventories	0	0	0	0	0	0
Total direct cost	0	0	53,700	166,200	939,600	1,159,500
Other project costs						
R&D necessary to complete project[b]	200	21,400	25,300	16,300	26,200	89,400
Conceptual design cost[c]	15,303	0	0	0	0	15,303
Decontamination & Decommissioning (D&D)	0	0	0	0	0	0
NEPA Documentation costs[d]	0	1,500	400	0	0	1,900
Other project-related costs[e]	0	0	800	900	89,097	90,797
Capital equipment not related construction[f]	0	100	2,100	700	200	3,100
Total, Other project costs	15,503	23,000	28,600	17,900	115,497	200,500
Total project cost (TPC)	15,503	23,000	82,300	184,100	1,055,097	1,360,000

a Construction line item costs included in this budget request are for providing Title I and II design, inspection, procurement, and construction of the SNS facility for an estimated cost of $1,159,500,000.

b A research and development program at an estimated cost of $89,400,000 is needed to confirm several design bases related primarily to the accelerator systems, the target systems, safety analyses, cold moderator designs, and neutron guides, beam tubes, and instruments. Several of these development tasks require long time durations and the timely coupling of development results into the design is a major factor in detailed task planning.

c Costs of $15,303,000 are included for conceptual design and for preparation of the conceptual design documentation prior to the start of Title I design in FY 1999.

d Estimated costs of $1,900,000 are included to complete the Environmental Impact Statement.

e Estimated costs of $90,797,000 are included to cover pre-operations costs.

f Estimated costs of $3,100,000 to provide test facilities and other capital equipment to support the R&D program.

7. Related Annual Funding Requirements [a]

	(FY 2000 dollars in thousands)	
	Current Estimate	Previous Estimate
Facility operating costs	21,300	N/A
Facility maintenance and repair costs	25,300	N/A
Programmatic operating expenses directly related to the f ility	22,500	N/A
Capital equipment not related to construction but related the programmatic effort in the facility	2,100	N/A
GPP or other construction related to the programmatic fort in the facility	1,000	N/A
Utility costs	30,400	N/A
Accelerator Improvement Modifications (AIMs)	4,100	N/A
Total related annual funding	106,700	N/A

[a] Expressed in FY 2006 dollars, the first full year of operation.

Computational and Technology Research

Program Mission

The mission of the Computational and Technology Research (CTR) program, which consists of two distinct activities, is

- to foster and support fundamental research in advanced computing research — applied mathematics, computer science, and networking — and to operate supercomputer, networking, and related facilities to enable the analysis, modeling, simulation, and prediction of complex phenomena important to the Department of Energy, and
- to foster and support high-risk research in the natural sciences and engineering in partnership with the private sector leading to innovative applications relevant to the Nation's energy sector.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goals

- Maintain world leadership in areas of advanced computing research relevant to the complex problems of the Department of Energy.
- Integrate the results of advanced computing research into the natural sciences and engineering.
- Provide world-class supercomputer and networking facilities for scientists working on problems that are important for the Department.
- Integrate and disseminate the results of high-risk research in the natural sciences and engineering to the private sector through the Laboratory Technology Research subprogram.

Program Objectives

- *Foster and support fundamental, peer-reviewed research.* — Foster research to create new fundamental knowledge in areas of advanced computing research important to the Department.
- *Apply advanced computing knowledge to complex problems of importance to DOE.* — Promote the transfer of the results of advanced computing research to contribute to DOE missions in areas such as the improved use of fossil fuels including understanding the combustion process; the atmospheric and environmental impacts of energy production and use including global climate modeling and subsurface transport; and future energy sources including fusion energy.
- *Plan, fabricate, assemble, and operate premier supercomputer and networking facilities.* — Serve researchers at national laboratories, universities, and industry, thus enabling both new understanding

through analysis, modeling, and simulation of complex problems and effective integration of geographically distributed teams through national collaboratories.

- *Transfer results of fundamental research to the private sector.* — Provide tangible results of research and development activities through cost-shared partnerships with industry.

Performance Measures

The Computational and Technology Research program measures performance in various ways, depending on the objective. However, performance measures fall into four broad categories: (1) peer review; (2) indicators or metrics (i.e., things that can be counted); (3) customer evaluation and stakeholder input; and (4) qualitative assessments, which might include historical retrospectives and annual program highlights. The key process is peer review of all research activities. Facility performance measures include achievement of performance specifications, operating time, throughput, user satisfaction, and effective utilization of resources as determined by reports from external review panels, user steering committees, and internal Office of Science (SC) program manager committees. In addition, CTR supercomputer and network facilities have periodic external performance reviews. The Energy Science Network (ESnet) operations and management were reviewed in this manner in FY 1998.

In FY 2000, (1) facilities, including the National Energy Research Scientific Computing Center (NERSC) and ESnet, will be operated within budget to meet user and overall SC program requirements; (2) the operating time lost at scientific facilities due to unscheduled NERSC/ESnet downtime will be less than 10 percent of the total scheduled possible operating time, on average; (3) all new and continuing research projects will undergo regular peer review and merit evaluation based on the principles set down in 10 CFR 605 for grants or in cooperative agreements supported by the Office of Science; (4) work performed by investigators supported by CTR will continue to be recognized as outstanding through the receipt of major prizes and awards; and (5) initiate 7 Laboratory Technology Research projects that address the Department's top priorities for science and technology, through cost-shared research partnerships with industry.

Significant Accomplishments and Program Shifts

The CTR program builds on decades of leadership in advanced computing. Some of the pioneering accomplishments of this program are:

Mathematical, Information, and Computational Sciences

- **Remote, interactive access to supercomputers.** At the National Magnetic Fusion Energy Computing Center [the predecessor to the National Energy Research Scientific Computing Center (NERSC)], DOE pioneered the concept of remote, interactive access to supercomputers. Before this time, scientists using supercomputers had to travel to the location of the computer to make use of it. In addition, users were only able to use these computers by submitting jobs and waiting for hours or days to see the output. The Mathematical, Information, and Computational Sciences (MICS) subprogram developed the first interactive operating system for supercomputers, Cray Time Sharing System (CTSS), as well as a nationwide network to allow remote users to have effective access to the computers. This operating system revolutionized

access to supercomputers by enabling users to see their jobs as they executed. When the National Science Foundation (NSF) initiated its Supercomputer Centers program in the 1970's, the CTSS operating system was adopted by the San Diego Supercomputing Center and the National Center for Supercomputing Applications to enable users to access NSF's first CRAY machines.

- **Numerical Linear Algebra Libraries**. Today's high performance computations rely on high performance, efficient libraries of numerical linear algebra software. These libraries, which are the core of numerical efforts in the solution of differential and integral equations — LINPACK, EISPAC, LAPACK, SCALAPACK — are the direct result of decades of DOE funding and basic research in this area. These libraries are used by thousands of researchers worldwide and are a critical part of the world's scientific computing infrastructure.

- **High Performance Parallel Interface (HiPPI)**. In order to develop a standard interface between supercomputers and other devices, such as disk arrays and archival tape systems, and visualization computers, DOE laboratories developed the high performance network interface (HiPPI) and led a consortium of vendors to make it the industry standard for the highest bandwidth interconnects between computers and peripheral devices. Many research issues in high speed signaling, data parallelism and high speed protocol design needed to be understood to enable this advance.

- **Parallel Virtual Machine (PVM) and Message Passing Interface (MPI).** DOE researchers developed PVM and MPI to enable scientists to make effective use of networks of workstations and massively parallel computers. Both of these software packages have become standards in the industry and are implemented by virtually all of the high performance computer manufacturers in the world. Both of these developments were enabled by over a decade of basic research in message passing and distributed computing supported by DOE along with many experiments to apply these techniques to real scientific problems.

- **Slow Start Algorithm for the Transmission Control Protocol (TCP).** Transmission Control Protocol (TCP) part of TCP/IP (Internet Protocol) is responsible for ensuring that packets arrive at their destination. In 1987, as DOE and the other Federal agencies were interconnecting their networks to form the core of the Internet, critical parts of the infrastructure began to fail. There was concern that this represented a fundamental flaw in the TCP/IP architecture; however, a researcher at LBNL applied ideas from fluid flow research to understand the problem and develop a solution. This new TCP algorithm was incorporated in virtually every commercial version of Internet software within 6 months and enabled the Internet to scale from a small research network to today's worldwide infrastructure.

Building on this long history of accomplishments, principal investigators of the Computational and Technology Research program this year received recognition through numerous prizes, awards, and honors. A sample of the significant accomplishments produced by the program this year is given below.

- **1998 Gordon Bell Prize for Best Performance of a Supercomputing Application.** An international team of scientists including those from the Department's Oak Ridge and Lawrence Berkeley National Laboratories won the 1998 Gordon Bell prize for best performance of a supercomputing application for simulation of magnetism metal alloys. The team won the award for their modeling of 1,024 atoms of a metallic magnet. The calculation submitted by the team to the Gordon Bell Prize judges performed at 657 Gigaflops performance level (657 billion

calculations per second); however, the team subsequently was able to raise the performance of their application to more than one teraflop (one trillion calculations per second.) In addition to supporting the winning entry, the CTR program partially supported the two other finalists.

- **1998 Fernbach Award.** Dr. Phillip Colella, a mathematician at DOE's Lawrence Berkeley National Laboratory, received the 1998 Sidney Fernbach Award at the SC98 conference in Orlando. Colella received the award for his "outstanding contribution in the application of high performance computers using innovative approaches." The Fernbach Award, created in memory of a computer scientist at DOE's Lawrence Livermore National Laboratory, is presented by the IEEE (Institute of Electrical and Electronics Engineers) Computer Society. Dr. Colella's research has focused on problems in Computational Fluid Dynamics and advanced techniques for the generation of the grids that form the basis for many scientific computations. His research has been applied to problems in the simulation of combustion devices as well as national security applications.

- **Simulation of Instabilities in Fluid Layers.** Many important physical systems can be described as layered fluids. For example, layers of oil float on salt water in geological structures. Even structures with layers of metal behave like layered fluids under high pressure and temperature. These types of systems develop very complex, unstable structures at the boundary between fluids. Computation of the characteristics of these boundaries is especially difficult, because their locations must be tracked accurately as part of the calculation. In addition, the most common formulations of the problem require many more grid points than are practical on even the largest computers. Applied mathematicians at the State University of New York, Stony Brook, in collaboration with physicists at Los Alamos National Laboratory (LANL) have discovered and implemented clever numerical schemes capable of following surfaces that can evolve into complicated shapes over time. They have used these new techniques to simulate this type of fluid instability under conditions where experiments are not possible, thus allowing design of devices for Defense Program's Advanced Strategic Computing Initiative and fusion energy applications. Modeling and simulation are absolutely vital since experimental data will never be available for conditions of importance to the designers.

- **Research in Optimization Impacts U.S. Industry.** Applied mathematicians at Rice University, working with engineers at Boeing, developed a software package for improving the manufacture of airplane components. The software combines new approaches to the optimization of systems having hundreds of thousands of parameters with research in the theory of control systems to enable engineers to optimize manufacturing processes. Previous design schemes for Boeing's production processes were based on simple "rules of thumb" that failed often in practice, and standard optimization packages were easily overwhelmed by the sheer size of the problems. This necessitated a complete rethinking of design and optimization strategies in order to accommodate industrial-size problems. The Rice researchers developed novel techniques in nonlinear optimization theory to correctly identify the underlying problems and provide feasible solutions. Boeing is using the software on its production line to lower costs and improve quality.

- **Law for Turbulent Stress Proved to be Invalid.** To design systems such as gas turbines, airplanes, or combustion devices where flow of gasses over physical structures is important, it is critical to be able to accurately describe the turbulent stress generated by the flow of the gas over the structure. Since the turn of the century, the standard methodology for calculating this was a

simple mathematical model called the "law of the wall." This model, which is found in every engineering textbook, is based on relatively crude approximations that have been accepted without serious thought since the turn of the century. Mathematicians at Lawrence Berkeley National Laboratory (LBNL) have recently developed a rigorous mathematical basis for calculating turbulent wall effects and demonstrated that the "law of the wall" is not valid in general. They showed by careful mathematical analysis that the correct description of turbulent effects on solid objects requires a family of "scaling laws" rather than a single "law of the wall." This is difficult research since it must blend hard mathematical analysis with the proper physical insights from the fluid dynamics of turbulent flows. The discovery will have profound consequences in the engineering and design of airplanes, gas turbines, and other systems where controlling turbulence is critical to performance. The mathematical predictions of the Berkeley group have been verified recently by experiments at Princeton.

- **R&D 100 Award to Sandia Researchers.** Researchers at Sandia National Laboratories were awarded an R&D 100 award in FY 1998 for the Aztec software package. Aztec is a collection of very high performance software routines that run on the highest performance computers in the nation to solve important linear algebra problems such as solving systems of millions of linear equations. This type of linear algebra is at the core solving ordinary and partial differential equations on computers as well as many other types of scientific computations. Aztec grew out of the successful research programs at Sandia in numerical linear algebra and parallel programming techniques.

- **Advanced Computing Software Tools Enable Rapid Application Development.** One of the major challenges in modern high performance computing is to develop tools that enable scientists to quickly create computer software to solve scientific problems. Otherwise, chemists, materials scientists, and others would spend their entire effort creating software for computers that would be obsolete just as the applications were ready. The speed of change in the underlying computer architectures and the complexity of these computers and their operating systems makes this a major area of research. The Parallel Object-Oriented Methods and Applications (POOMA) Framework effort at LANL is one promising research approach to developing effective tools to help scientists in the disciplines develop software. In an early test with POOMA, a post-doc with no parallel programming experience developed computer software to solve a three dimensional fluid turbulence problem (including the tools to visualize the results while the program was running) in only six weeks rather than the 6-9 months required in similar efforts. POOMA is used extensively by two of the scientific applications pilots — the computational accelerator physics and numerical tokamak turbulence projects.

- **New Scientific Application Enabled By Interfacing Two Software Packages.** One research challenge facing advanced computing is to enable software developed by different teams to work together on massively parallel computers. Recently researchers at Argonne National Laboratory (ANL) and Lawrence Livermore National Laboratory (LLNL) have demonstrated that it is possible for well-designed components developed at different laboratories to be easily used together by providing each with a common interface. The latest generation of ordinary differential equation solvers for systems, whose behavior combines fine scale and large scale features, developed at LLNL has been interfaced with a large family of parallel algebraic solvers developed at ANL. This coupled software system has enabled several new applications. One of these is a collaboration of researchers at Louisiana Tech University and Oak Ridge National

Laboratory (ORNL) to develop a code for fully three-dimensional simulations of the dynamics of micro-structural interactions in materials. This code would not have been possible before the researchers had access to the coupled ANL-LLNL system.

- **Significant Speedups Achieved For Laue Crystallographic Analysis.** Advances in numerics coupled with work to enable software to run in parallel on many processors has enabled researchers in the "Supercomputer Solution of Massive Crystallographic and Microtomographic Structural Problems" scientific application pilot project to dramatically reduce the time required to analyze the data from Laue diffraction experiments. A typical illustration comes from progress made on a scientific applications project—diffraction patterns and intensities produced by x-rays passing through a crystal lattice are used to deduce information about molecular structures. The Laue diffraction technique is the most important tool in time-resolved crystallography, where structure data are captured rapidly to image the structure of a molecule at various stages of a reaction. Improved optimization and numerical techniques have been applied to the code that performs the complicated task of analyzing Laue diffraction data to obtain the structure of the molecules. The dramatic improvements in time-to-solution that have been made will significantly enhance experimental capabilities because runtimes are reduced from hours to minutes. These results are expected to be especially important for the 30 percent of users of DOE light sources who are involved in discovering protein structures.

- **ESnet Demonstrates Priority Service For Internet Traffic.** Scientists at two national laboratories successfully selected marked Internet traffic for priority service over unmarked traffic in a cross-country demonstration. This demonstration is a key milestone in the development of a broad set of capabilities called "differentiated services," which are required for the Internet to be able to give different levels of service on demand to network customers. The demonstration of such capabilities for production-mode scientific research between Lawrence Berkeley National Laboratory and Argonne National Laboratory across the ESnet paves the way for more reliable and constant connectivity via priority bandwidth on the Internet. Achieving this improved level of service is essential to the work of the Department, which is pioneering the use of various technologies to allow scientists at more than 30 DOE national labs to share access to some of the Nation's most advanced research facilities. The complex interactions between software on computers, network hardware such as routers, and telecommunications equipment operated by commercial carriers make this a difficult research problem. In addition, all of these components must be capable of efficiently scaling up to operate across the worldwide Internet which processes tens of billions of packets a month.

- **Collaboratory Tool Attracts Users.** The electronic notebook collaboratory tool project has been so well received that over eighty groups across the country have adopted the prototype electronic notebook. Some are DOE projects, but many are from outside the Department including pharmaceuticals, chemical processing and medicine. The electronic notebook is valuable to researchers because: it can be shared by a group of researchers; it can be accessed remotely; it cannot be misplaced, lost, or accidentally destroyed (if backed up); it is easy to incorporate computer files, plots, etc.; notarization and authentication are possible; it can easily be searched for information; it can include multimedia; and it can include hyperlinks to other information. In order to enable these capabilities, the electronic notebook project has had to overcome a number of challenges including the development of new technologies for describing types of data such as

experimental protocols and experimental devices, which are not well treated by traditional techniques.

Laboratory Technology Research

- In FY 1999, the SC single-purpose laboratories (Fermi National Accelerator Laboratory, Thomas Jefferson National Accelerator Facility, Princeton Plasma Physics Laboratory, and Stanford Linear Accelerator Center) and Ames Laboratory were reinstated into the Laboratory Technology Research (LTR) subprogram, thus restoring the subprogram to its original participants. LTR now provides coverage to more regions of the country where small businesses, in particular, can take advantage of the resources at SC laboratories. LTR capabilities have been enhanced for cost-shared partnerships in fusion energy sciences, high energy physics, nuclear physics, materials sciences, chemical sciences, structural biology, and other disciplines.
- The LTR subprogram received two R&D-100 awards in 1997 and three R&D-100 awards in 1998. The 1998 awards were given to:
  - Oak Ridge National Laboratory, in collaboration with the Society of Exploration Geophysicists, for "Advanced Computational Tools for 3-D Seismic Analysis." This research was cosponsored by DOE's Office of Fossil Energy.
  - Argonne National Laboratory in collaboration with Front Edge Technology of Baldwin Park, CA, Stirling Motors of Ann Arbor, MI, and Diesel Technology of Wyoming, MI, for "Near-Frictionless Carbon Coatings."
  - Argonne National Laboratory, in collaboration with Commonwealth Edison of Chicago, IL, for "Combined Expert System/Neural Network for Process Fault Diagnostics."

Advanced Energy Projects

- The Advanced Energy Projects subprogram will be terminated in FY 2000.

Scientific Facilities Utilization

The CTR program request includes $27,500,000 in FY 2000 to support the NERSC Center. This investment will provide research time for about 3,500 scientists in universities, federal agencies, and U.S. companies. It will also leverage both federally and privately sponsored research, consistent with the Administration's strategy for enhancing the U.S. National science investment. The proposed funding will enable NERSC to maintain its role as the Nation's largest, premier unclassified computing center, which is a critical element in the success of many SC research programs. Research communities that benefit from NERSC include structural biology; superconductor technology; medical research and technology development; materials, chemical, and plasma sciences; high energy and nuclear physics; and environmental and atmospheric research.

Funding of Contractor Security Clearances

In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $46,000 and $47,000 for estimated contractor security clearances in FY 1999 and FY 2000, respectively, within this decision unit.

Scientific Simulation Initiative

The CTR program also leads DOE's Scientific Simulation Initiative (SSI), an integrated effort bringing together computational and communication resources, focused research in scientific disciplines, and research in computer science and other enabling technologies to solve the complex problems that characterize DOE's scientific research needs. The SSI is a significant component of the broader President's Information Technology Research Initiative (ITRI) which responds to the recommendations of the President's Information Technology Advisory Committee (PITAC). The SSI couples research in advanced scientific applications in the programs of the Office of Science (SC) with research in computer science and enabling technologies and advanced computing and communications facilities. It is a joint program between CTR and the other program offices in SC. The overview of the integrated program is given here; however, the specific contributions of the other programs (Basic Energy Sciences and Biological and Environmental Research) are included in their budgets. This initiative will build on and benefit from the demonstrated capabilities brought about by the Department's Accelerated Strategic Computing Initiative (ASCI) that have made it possible to obtain computational capabilities 100 times faster than currently in common use. The mission of this proposed effort is to develop further and to employ the emerging generation of very high performance computers as major tools for scientific enquiry. These resources will revolutionize our approach to solving complex problems in energy, environment, fundamental research, and technology development as well as stimulate our national system of innovation. The goal of the SSI is to:

> *"Revolutionize our ability to solve scientific problems of extraordinary complexity and to apply these resources to scientific problems relevant to the Department's mission through the exploitation of the emerging power of exceptional computational capabilities."*

As has been discussed earlier in this budget, scientific research has long been characterized as the interplay of theory and experimentation. Over the last half century the emergence of computers for solving complex mathematical problems and for analyzing large sets of data has introduced a third activity to complement both theory and experimentation. Defined as simulation and modeling, but also encompassing a broad range of data analyses, the application of computational resources to complex scientific problems has made increasingly important contributions to scientific discovery and understanding as those resources have grown more powerful. The SSI builds on DOE's 50 year history

of transforming advances in information technology into tools for scientific discovery to accelerate this process through a partnership with DOE laboratories, the academic community and industry.

This program began with workshops focused on the scientific opportunities that could result from access to multi-teraflop computing. All of the programs in the Office of Science made convincing cases that access to computing at this level would open new areas of research and enable solutions to new classes of problems. These workshops culminated in a workshop on advanced scientific and engineering computing jointly sponsored by DOE and the National Science Foundation at the National Academy of Sciences in July, 1998. This workshop validated the opportunity for scientific discovery and advanced engineering afforded by terascale computing. Throughout this document, the term teraflop is used in discussing the computational resources under consideration. One teraflop is one trillion (10^{12}) floating point operations per second. For comparison, desktop personal computers are generally capable of one hundred thousand (10^{5}) floating point operations per second. Current commercially available supercomputers are capable of nearly half teraflop performance.

Based on the input from these workshops, a plan for the SSI was developed to realize the goals of the SSI. It is a balanced plan of research which includes advanced computing and communications facilities, such as terascale computers and very high performance networks, computer science and enabling technology research to make these facilities useful, and investments in scientific disciplines to enable development of the advanced applications that will be required. The strategy for SSI applications has two components. The first was a selection of two mission critical application areas: global systems and combustion systems. In both of these cases, the initial SSI planning workshops identified significant opportunities for advanced computation to dramatically advance the state of the art with important impact on the nation's ability to respond effectively to issues such as the effect of greenhouse gasses on global climate and development of internal combustion engines able to meet societal goals for efficiency and pollution control. These two initial applications play a significant role in defining the requirements for computer and communications facilities as well as the computer science and enabling technology which will be required. These two applications will also play an important role in testing, integrating, and debugging both hardware and software components. The second component of the SSI applications strategy is an open, peer reviewed competition among basic science disciplines to select a small number for initial inclusion in the initiative and access to SSI computer and communications facilities.

The Scientific Simulation Initiative Builds on ASCI

One reason the Department is prepared to undertake this initiative at this time is that the proposed effort builds upon the DOE Defense Program (DP) Accelerated Strategic Computing Initiative (ASCI) which was launched in 1996 with a focus on multi-teraflop scale computing to meet the imposing challenges posed by Science Based Stockpile Stewardship.

Meeting the goals set for ASCI requires computers with capabilities exceeding those available today by a factor of one thousand and the ASCI program is following an aggressive hardware and software technology plan that will achieve the development and use of 100 teraflop computers by 2004. As a result of the ASCI effort, much more powerful computer systems, designed for full simulation of all scientific aspects of nuclear stockpile stewardship, have been developed. ASCI continues to develop the computational infrastructure needed to make effective use of these systems, including large-scale scientific data storage capabilities, computational grids for high-speed communication, software development systems for massively parallel computer systems, high-performance visualization systems,

etc. These advances, although focused on DOE's stockpile stewardship responsibility, presage the development of a comprehensive simulation capability for a whole range of scientific problems.

A Critical Element in the President's Initiative in Information Technology

Although the SSI is focused on revolutionary uses of computing as a tool for science, many of the investments in computer science and enabling technology will contribute to and benefit from the broader ITRI initiative. PITAC recommended significant increases in support for basic research in: Software, Scalable Information Infrastructure, High End Computing, and Socio-Economic and Workforce Impacts, as well as support of research projects of broader scope and visionary "Expeditions to the 21st century" to explore new ways that computing could benefit our world.

The SSI Computer Science and Enabling Technology (CSET) program has four components: Algorithms, Models, Methods and Libraries; Problem Solving Environments and Tools; Distributed Computing and Collaboration Technology; and Visualization and Data Management. The underlying strategy in all of these areas is based on taking advantage of the most recent work in software components and extending it to enable it to function at very high performance. In addition, the realities of the hardware platforms that will be available at SSI performance levels requires that the components be fault tolerant and that techniques be developed to enable the assembly of components into reliable fault tolerant assemblies. Thus, with respect to the PITAC recommendation on Software development, we expect SSI to be a significant program for fundamental research in software development methods and component technologies and to begin the development of a national repository of software components.

In addition, challenges facing SSI in the area of data management and visualization will require significant new research in the areas of human computer interfaces and interaction to enable researchers to navigate and extract scientific knowledge from petabyte-scale data archives resulting from SSI scale simulations and the coming generation of large experimental facilities. Both the SSI planning workshops as well as the ASCI Visualization Corridors workshops identified this as a critical area that would perhaps be an "Expedition to the 21st Century."

However, there are areas of software research included in the PITAC report that SSI will not cover, particularly software for systems such as air traffic control.

With regard to the PITAC recommendation on a Scalable Information Infrastructure, SSI will have a more modest impact because the problem for The SSI is primarily providing very high performance access for a modest number of people rather than providing access to billions of users worldwide.

With regard to the PITAC recommendation on High End Computing, SSI will have a major impact on R&D to improve the performance of high end computers, acquiring high end systems to support scientific research and moving towards petaop (1000 teraflop) systems by 2010. However, while SSI is a part of the solution to the problem of access to high end computing for science and engineering research and will develop many of the technologies needed to make this possible, the computing systems proposed are scaled to support a modest number of focused scientific projects, which will be collaborative efforts of large teams of disciplinary scientists, computer and computational scientists and mathematicians.

With regard to the PITAC recommendation on Socio-Economic and Workforce Impacts, The SSI will increase research funding in relevant areas of IT and will develop strategies to retrain existing scientists and IT workers as well as train new undergraduate and graduate students in these disciplines.

In addition to the research contributions that SSI will make to the broader ITRI, SSI facilities will provide crucial testbeds for testing many of the ideas that emerge from basic research in information technology.

As stated at the outset the SSI is an integrated initiative from the Office of Science. The descriptions of the various components, corresponding to the goals are included in the budgets of the responsible offices. The SSI has five principal objectives:

- **Revolutionize scientific research by the application of teraflop computational resources.** Whereas the scientific accomplishments of this century have resulted in seeking and understanding the fundamental laws that govern our physical universe, the science of the coming century will be characterized by synthesis of this knowledge into predictive capabilities for understanding and solving a wide range of scientific problems, many with practical consequences. In this endeavor, the computer will be a primary instrument of scientific discovery. Many areas of scientific inquiry critical to the Department's mission will be advanced dramatically with access to teraflop scale computing including but not limited to materials sciences, structural genomics, high energy and nuclear physics, subsurface flow, and fusion energy research.
- **Discover, develop and deploy crosscutting computer science and applied mathematics technology.** The practical and intellectual challenges to making effective use of terascale computers require the development of a terascale technology base in software, networking, data management and visualization, communications, and operating environments to enable scientists to make effective use of the simulation infrastructure.
- **Establish a national terascale distributed scientific simulation infrastructure.** This network of terascale computers, ultra-high speed communications, science centers, and support centers in academia, the national laboratories, and industry will provide the advanced computing testbeds which enable the accomplishment of the first three objectives.
- **Understand, model, and predict the effects on the earth's global environment of atmospheric greenhouse gas emissions, with an emphasis on carbon dioxide.** Through the use of teraflop scale computers, accelerate progress in general circulation model development and application to reduce substantially the uncertainties in decade-to-century model-based projections of global environmental change and to increase the utility of such projections to the broad research community. Current models of global systems cannot presently achieve regional specification in global environmental change projections with the requisite accuracy and reliability needed to support national and international energy and environmental policies. Work towards this objective will also play a significant role in defining, testing, and integrating the SSI facilities and SSI crosscutting computer science and applied mathematics technologies into tools for scientific dsicovery.
- **Understand, model, and predict the behavior and properties of combustion processes and devices.** With teraflop scale computing resources and a concerted research program in combustion modeling, develop a new generation of combustion modeling tools for accelerated

design of combustion devices meeting national goals of emission reduction and energy conservation. Through provision of a comprehensive understanding of the details of combustion, design engineers will have the computational tools to predict the chemical outcome of combustion processes with practical reliability, thus avoiding a time consuming, trial and error approach to the design of combustion devices (gas turbines, internal combustion engines, etc.) Work towards this objective will also play a significant role in defining, testing, and integrating the SSI facilities and SSI crosscutting computer science and applied mathematics technologies into tools for scientific discovery.

This initiative is a part of the broader President's ITRI. The Department's primary focus is advancing science through terascale computing. To accomplish these goals, DOE will partner with other agencies, particularly the National Science Foundation, to leverage the strengths of both agencies. In the case of research in global systems the research is already part of a broad interagency effort coordinated under the U.S. Global Change Research Program (USGCRP). Computer science and enabling technologies activities have been coordinated between agencies through the Computing, Information, and Communications R&D Subcommittee of the NSTC for a number of years. As a part of this initiative, closer ties will be established between DOE-funded activities and activities funded by other agencies. The development of enabling technologies for SSI will also be coordinated with the development of related technologies for ASCI through a joint CTR - ASCI research management committee. Where appropriate, joint interagency programs in other scientific disciplines may be established.

The CTR budget includes descriptions of the SSI computational science and enabling technology, as well as advanced computing and communications facilities elements of the SSI. In addition, the CTR budget includes funding for the competitive, peer reviewed selection of a small number of basic science applications to complement the two larger integrated applications efforts. The description of the Global Systems element of the SSI is included in the Biological and Environmental Research (BER) budget and the description of the Combustion Systems element is included in the Basic Energy Sciences (BES) budget. For reference, a high level summary of the proposed budget for the entire SSI initiative is given in the table below. These amounts will be reduced for the required SBIR/STTR assessments of 2.65%.

Objective	Program	FY 2000 Request
Earth's Global Environment	Biological and Environmental Research	$10 million
Combustion Systems	Basic Energy Sciences	$7 million
Basic Science Applications	Computational and Technology Research	$6 million
Computer Science and Enabling Technology	Computational and Technology Research	$16 million
SSI Facility Operations	Computational and Technology Research	$30 million
Staffing Resources	Science Program Direction	$1 million
Total SSI		$70 million

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Orginal Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Computational and Technology Research					
Mathematical, Information, and Computational Sciences	124,026	139,300	-466	138,834	184,575
Laboratory Technology Research	15,379	16,200	-58	16,142	14,300
Advanced Energy Projects	7,374	2,500	-5	2,495	0
Subtotal, Computational and Technology Research	146,779	158,000	-529	157,471	198,875
Use of Prior Year Balances	-1,714[a]	-1,573[a]	0	-1,573[a]	0
General Reduction	0	-529	+529	0	0
Total, Computational and Technology Research	145,065[b]	155,898	0	155,898	198,875

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Excludes $3,582,000 which has been transferred to the SBIR program and $215,000 which has been transferred to the STTR program

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	%Change
Albuquerque Operations Office					
Los Alamos National Laboratory	14,614	13,034	10,894	-2,140	-16.4%
National Renewable Energy Laboratory	498	127	0	-127	-100.0%
Sandia National Laboratories	5,232	5,293	3,779	-1,514	-28.6%
Total, Albuquerque Operations Office	20,344	18,454	14,673	-3,781	-20.5%
Chicago Operations Office					
Ames Laboratory	2,290	1,939	1,490	-449	-23.2%
Argonne National Laboratory	16,869	15,430	13,176	-2,254	-14.6%
Fermi National Accelerator Laboratory	100	50	332	+282	+564 0%
Brookhaven National Laboratory	2,843	1,457	2,589	+1,132	+77 7%
Princeton Plasma Physics Laboratory	90	121	332	+211	+174 4%
Total, Chicago Operations Office	22,192	18,997	17,919	-1,078	-5.7%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	57,916	53,938	49,377	-4,561	-8.4%
Lawrence Livermore National Laboratory	2,755	2,940	640	-2,300	-78.2%
Stanford Linear Accelerator Center	980	357	782	+425	+119.0%
Total, Oakland Operations Office	61,651	57,235	50,799	-6,436	-11 2%
Oak Ridge Operations Office					
Oak Ridge Inst. For Science & Education.	335	0	244	+244	+100.0%
Oak Ridge National Laboratory	19,434	10,415	6,876	-3,539	-34.0%
Thomas Jefferson National Accelerator Facility	190	100	283	+183	+183.0%
Total, Oak Ridge Operations Office	19,959	10,515	7,403	-3,112	-29 6%
Richland Operations Office					
Pacific Northwest National Laboratory	4,188	3,238	3,584	+346	+10.7%
All Other Sites[a]	18,445	49,032	104,497	+55,465	+113 1%
Subtotal, Computational and Technology Research	146,779	157,471	198,875	+41,404	+26.3%
Use of Prior Year Balances	-1,714[b]	-1,573[b]	0	+1,573[b]	+100.0%
Total, Computational and Technology Research	145,065[c]	155,898	198,875	+42,977	+27.6%

[a] Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

b Share of Science general reduction for use of prior year balances assigned to this program The total general reduction is applied at the appropriation level

c Excludes $3,582,000 which has been transferred to the SBIR program and $215,000 which has been transferred to the STTR program

Site Description

Ames Laboratory

Ames Laboratory is a Multiprogram Laboratory located on 10 acres in Ames, Iowa. The MICS subprogram at Ames Laboratory conducts research in the materials scientific application pilot project, which focuses on applying advanced computing to problems in microstructural defects, alloys, and magnetic materials, and in computer science. The LTR subprogram at Ames also conducts research in the physical, chemical, materials, mathematical, engineering, and environmental sciences through cost-shared collaborations with industry.

Argonne National Laboratory

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. The MICS subprogram at ANL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. ANL also participates in several scientific application and collaboratory pilot projects as well as supporting an advanced computing research facility. The advanced computing research facility (ACRF) at ANL focuses on advanced computers in the IBM-SP family of technologies as well as the interaction of those architectures with advanced visualization hardware. The LTR subprogram at ANL also conducts research motivated by practical energy payoffs through cost-shared collaborations with industry. The areas emphasized in the research portfolio are chemistry of ceramic membranes, separations technology, near-frictionless carbon coatings, and advanced methods for magnesium production.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. The LTR subprogram at BNL conducts research motivated by practical energy payoffs through cost-shared collaborations with industry. The areas emphasized in the research portfolio are materials for rechargeable lithium batteries, sensors for portable data collection, catalytic production of organic chemicals, and DNA damage responses in human cells.

Fermi National Accelerator Laboratory (Fermilab)

Fermilab is located on a 6,800-acre site about 35 miles west of Chicago, Illinois. The LTR subprogram at Fermilab conducts research in areas such as: superconducting magnet research, design and development, detector development and high-performance computing through cost-shared collaborations with industry.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory (LBNL) is a Multiprogram Laboratory located in Berkeley, California. The Laboratory is on a 200 acre site adjacent to the Berkeley campus of the University of California. The MICS subprogram at LBNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. LBNL participates in several scientific application and collaboratory pilot projects as well as supporting an advanced computing research facility. The advanced computing research facility (ACRF) at LBNL currently focuses on very large scale computing on hardware in the T3E architecture from SGI-Cray including issues of distributing jobs over all the processors efficiently and the associated system management issues. LBNL manages the Energy Sciences Network (ESnet). ESnet is one of the world's most effective and progressive science-related computer networks that provides worldwide access and communications to Office of Science (SC) facilities. In 1996, the National Energy Research Scientific Computing Center (NERSC) was moved from the Lawrence Livermore National Laboratory to LBNL. NERSC provides a range of high-performance, state-of-the-art computing resources that are a critical element in the success of many SC research programs. The LTR subprogram at LBNL also conducts research motivated by practical energy payoffs through cost-shared collaborations with industry. The areas emphasized in the research portfolio are molecular lubricants for computers, advanced material deposition systems, screening novel anti-cancer compounds, and innovative membranes for oxygen separation.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a Multiprogram Laboratory located on a 821 acre site in Livermore, California. The MICS subprogram at LLNL involves significant participation in the advanced computing software tools program as well as basic research in applied mathematics.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a Multiprogram Laboratory located on a 27,000 acre site in Los Alamos, New Mexico. The Mathematical Information and Computational Sciences (MICS) subprogram at LANL conducts basic research in the mathematics and computer science and in advanced computing software tools. LANL also participates in several scientific application and collaboratory pilot projects as well as supporting an advanced computing research facility. The Advanced Computing Research Facility (ACRF) at LANL focuses on a progression of technologies from SGI - Cray involving Origin 2000 Symmetric Multiprocessor Computers linked with HiPPI crossbar switches. This series of research computers has been given the name "Nirvana Blue."

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE) is located on 150 acres in Oak Ridge, Tennessee. ORISE provides support for education activities funded within the CTR program.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. The MICS subprogram at ORNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. ORNL also participates in several scientific application and collaboratory pilot projects. The LTR subprogram at ORNL also conducts research motivated by practical energy payoffs through cost-shared collaborations with industry. The areas emphasized in the research portfolio are high temperature superconducting wire, microfabricated instrumentation for chemical sensing, and radioactive stents to prevent reformation of arterial blockage.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL) is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. The MICS subprogram at PNNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. PNNL also participates in several scientific application pilot projects. The LTR subprogram at PNNL also conducts research motivated by practical energy payoffs through cost-shared collaborations with industry. The areas emphasized in the research portfolio are mathematical simulation of glass production, interactions of biological polymers with model surfaces, and characterization of micro-organisms in environmental samples.

Princeton Plasma Physics Laboratory

The Princeton Plasma Physics Laboratory (PPPL), a laboratory located in Plainsboro, New Jersey, is dedicated to the development of magnetic fusion energy. The LTR subprogram at PPPL conducts research in areas that include the plasma processing of semiconductor devices and the study of beam-surface interactions through cost-shared collaborations with industry.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a Multiprogram Laboratory, with a total of 3,700 acres, located in Albuquerque, New Mexico, with sites in Livermore, California, and Tonapah, Nevada. The MICS subprogram at SNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools and collaboratory tools. SNL also participates in several scientific application and collaboratory pilot projects.

Stanford Linear Accelerator Center

The Stanford Linear Accelerator Center (SLAC) is located at the edge of Silicon Valley in California about halfway between San Francisco and San Jose on 426 acres of Stanford University land. The LTR subprogram at SLAC conducts research in areas such as advanced electronics, large-scale ultra-high vacuum systems, radiation physics and monitoring, polarized and high-brightness electron sources, magnet design and measurement, and controls systems through cost-shared collaborations with industry.

Thomas Jefferson National Accelerator Facility

The Thomas Jefferson National Accelerator Facility (TJNAF) is a basic research laboratory located on a 200 acre site in Newport News, Virginia. The LTR subprogram at the TJNAF conducts research in such areas as accelerator and detector engineering, superconducting radiofrequency technology, speed data acquisition, and liquid helium cryogenics through cost-shared collaborations with industry.

All Other Sites

The CTR program funds research at 71 colleges/universities located in 24 states. This line also includes funding of research awaiting distribution pending completion of peer review results.

Mathematical, Information, and Computational Sciences

Mission Supporting Goals and Objectives

The Mathematical, Information, and Computational Sciences (MICS) subprogram supports advanced computing research — applied mathematics, high performance computing, and networking — and operates supercomputer and associated facilities that are available to researchers 24 hours a day, 365 days a year. The combination of support for fundamental research, computational and networking tools development, and high-performance computing facilities provides scientists with the capabilities to analyze, model, simulate, and — most importantly — predict complex phenomena of importance to the Office of Science and to the Department of Energy.

Examples of the complex problems addressed by the Office of Science and the Department of Energy are: climate modeling, including the effects of greenhouse gases on global climate change; the combustion process, including the simulation of combustion in devices such as diesel engines; the subsurface transport of pollutants; the rational design of new materials to produce, for example, new alloys, superconductors, polymers, and catalysts; the effects of aging on the nuclear stockpile; and the analysis of vast amounts of real data from experiments at the Office of Science facilities for high energy physics, nuclear physics, materials sciences, chemical sciences, structural biology, and other disciplines.

For many such problems, traditional theoretical and experimental approaches may not be suitable; theory may be inadequate to handle the complexity, and experiments may not be feasible, because they are too dangerous, too expensive, or simply impossible owing to the length and time scales involved. Furthermore, experiments at the Office of Science facilities may generate millions of gigabytes (petabytes) of data per year (which would fill the disk drives of millions of today's personal computers) presenting significant computational and communications challenges in analyzing and extracting understanding from the data.

The increases in computational and communications capabilities achieved over the past two decades have made simulation a third branch of science that now complements theory and experiment and allows a new approach to previously intractable problems. However, as computational and communications capabilities have increased, so too have the challenges associated with effectively using these capabilities. The rate of increase in these capabilities itself poses formidable challenges. Significant hardware changes can occur as often as every 18 months; these, in turn, may require completely new approaches to computing software. This has already changed the way in which computation is performed in scientific disciplines such as materials science, biology, and fusion energy. Teams involving scientists from the disciplines as well as mathematicians; computer scientists; and experts in computer graphics, data management, and advanced computer networks are now required to address scientific problems that make use of the most modern computer and communications capabilities. This situation is quite different from that of even ten years ago when individual scientists could code and perform calculations with little or no support from others.

These same increases in computational and communications capabilities are having a second important impact on the way science is conducted. It is now possible for large geographically distributed teams to easily and effectively collaborate using major experimental facilities, computational resources, and data

resources. The name given to such optimized linkages among geographically distributed resources is "collaboratories." In the coming years, they are expected to play an increasingly important role in the Nation's scientific enterprise.

In order to enable scientists in the Office of Science to make effective use of these capabilities, the MICS subprogram supports research in three areas:

- Applied Mathematics. Research on the underlying mathematical understanding and numerical algorithms to enable effective description and prediction of physical systems such as fluids, magnetized plasmas, or protein molecules. This includes, for example, methods for solving large systems of partial differential equations on parallel computers, techniques for choosing optimal values for parameters in large systems with hundreds to hundreds of thousands of parameters, improving our understanding of fluid turbulence, and developing techniques for reliably estimating the errors in simulations of complex physical phenomena.
- Computer Science. Research in computer science to enable large scientific applications through advances in massively parallel computing such as very lightweight operating systems for parallel computers, distributed computing such as development of the Parallel Virtual Machine (PVM) software package which has become an industry standard, and large scale data management and visualization. The development of new computer and computational science techniques will allow scientists to use the most advanced computers without being overwhelmed by the complexity of rewriting their codes every 18 months.
- Networking. Research in high performance networks and information surety required to support high performance applications — protocols for high performance networks, methods for measuring the performance of high performance networks, and software to enable high speed connections between high performance computers and networks. The development of high speed communications and collaboration technologies will allow scientists to view, compare, and integrate data from multiple sources remotely.

In all of these areas — applied mathematics, computer science, and networking — the requirements far exceed the current state-of-the-art; furthermore, the requirements far exceed the tools that the commercial marketplace will deliver. In addition to these fundamental research efforts, the MICS subprogram takes the results of these efforts and forms partnerships with users in scientific disciplines to validate the usefulness of the ideas and to develop them into tools. MICS also provides the advanced computing and communications facilities that enable scientists to use these tools.

MICS provides two types of advanced computing and communications facilities. The first type of facility enables scientists to use the tools developed. Examples are NERSC and ESnet. The second type of facility is itself a research project. The principal current examples of this type of facility are the Advanced Computing Research Facilities (ACRFs) at Argonne National Laboratory, Lawrence Berkeley National Laboratory, and Los Alamos National Laboratory that represent the evolution of the High Performance Computing Research Centers and were established as part of the High Performance Computing and Communications initiative. The ACRFs combine research in computer software and hardware with targeted applications. One of the major issues that these facilities attempt to address is how different choices in computer architecture affect the ability of a system to scale to very large numbers of processors and very high performance. In order to address these issues, computers at a scale that push the state-of-the-art must be sited at the ACRFs. These computers enable research in computers

and computing, but they are not sufficiently mature or robust for production computing by large numbers of users.

Partnerships with the scientific disciplines are an important management philosophy in the MICS subprogram. Partnerships with the scientific disciplines are critical, because they test the usefulness of current advanced computing research, enable MICS to transfer the results of this research to scientists in the disciplines, and help define promising areas for future research. Finally, to develop future generations of scientists with the breadth of skills required to be effective both in advanced computing research and in interacting with disciplinary sciences, MICS supports the Computational Science Graduate Fellowship program.

The MICS subprogram includes the Department's participation in the President's Next Generation Internet (NGI) Initiative. This initiative will create the foundation for more powerful and versatile networks of the 21st century, just as previous federal investments in information technology R&D created the foundation for today's Internet. DOE's participation in this initiative is focused on network requirements that will enable data-intensive scientific research not now possible because of network limitations. It is anticipated that the results and "spinoffs" of this research, after testing and prototyping by the scientific community, will impact broad commercial use of networks.

DOE's NGI research program is focused on discovering, understanding, developing, testing and validating the networking technologies needed to enable wide area, data intensive and collaborative computing that is not currently possible. This program will integrate scientists working on fundamental research in applied mathematics, computer science, and networking with scientists working on DOE applications to develop new ways to link scientists with DOE's major scientific user facilities and computational centers. Such research is needed to enable effective use of petabyte/year High Energy and Nuclear Physics facilities such as the Relativistic Heavy Ion Collider (RHIC); to provide remote visualization of terabyte to petabyte data sets from computational simulation; to develop advanced collaboratories; and to enable effective remote access to tomorrow's advanced scientific computers. These applications share two important characteristics. They all involve extremely large data sets, and they all require that scientists be able to interact with the data in (nearly) real time. Current network technology limitations significantly limit our ability to address either of these characteristics.

The NGI activities are critical for DOE's fundamental science research. For example, using the current Internet, it would take about 2,500 hours to transmit one day's data from RHIC to one remote site for analysis. Typical RHIC experimental collaborations involve thousands of scientists and hundreds of institutions spread across the country and the world. Management of scientific data is further complicated because the data must be managed in large units. This is very different than data management in the commercial sector. For example, a standard telecommunications billing record is only 180 bytes long; a large web page is 500 kilobytes; but the data from a global climate model at any given time during the simulation (a single time step) may be greater than a gigabyte or 2,000 times as large as that of a large web page!

The technologies developed for commercial network traffic are simply inadequate for scientific network traffic. Significant *research* is needed to enable today's commercial networks to be used for scientific data. This research must include advanced protocols, special operating system services for very high speed, and very advanced network control. For example, a coast to coast gigabit/second network may have as much as a gigabit of data in transit at any one time. If this is scientific data this might be one

packet. Current protocols would require that all of the switches along the way be able to buffer a gigabit of data at very high rate, which is not possible with today's switches. Therefore research is required. The issues related to managing a single gigabit packet versus 2,000 500 kilobit packets are very different.

In addition to the complications posed by the transmission of large data sets, there are additional complications that result from the many different kinds of network devices, network-attached devices, and services that need to be integrated together. Examples of the components and services that need to be integrated include: network resources, data archives on tape, high performance disk caches, visualization and data analysis servers, authentication and security services, and the computer on a scientist's desk. This type of integration, as well as the issues of improving the performance of the individual components, all require significant research because the issues are currently not well understood. Indeed, the first identification of many of these issues is the result of previous work in collaboratories and visualization supported by this subprogram. Thus DOE's participation in the NGI builds on previous results of the MICS subprogram to address critical issues in the network. Furthermore, the differences between the requirements of commercial networks and networks for scientific research require DOE to conduct this research because these tools and technologies will not be developed by commercial R&D. However, there will be tremendous "spinoff" benefits to the Internet in general after the research is completed and the results enhance commercial networks.

Scientific Simulation Initiative

This budget also includes the MICS subprogram's contribution to DOE's Scientific Simulation Initiative (SSI), an integrated effort bringing together computational and communication resources, focused research in scientific disciplines, and research in computer science and other enabling technologies to solve the complex problems that characterize DOE's scientific research needs. The SSI couples research in advanced scientific applications in the programs of the Office of Science with research in computer science and enabling technologies and advanced computing and communications facilities. It is a joint program between CTR and the other program offices in SC.

It is a requirement for the success of this program to use the expertise that exists in national laboratories, universities, and industry and, where appropriate, formation of multidisciplinary teams of researchers. Participants from various institutions will be encouraged through open peer reviewed competitions. Also, strong partnerships with the DOE ASCI program and complementary programs in other agencies will be essential. The overview of the integrated program is given in the Program Mission statement of the CTR budget; however, the specific contributions of the MICS subprogram are described below.

MICS contributes to the SSI in three ways:

Management of the Computer Science and Enabling Technology (CSET) component of the SSI;

Management of the SSI Advanced Computing and Communications Facilities; and

Management of the peer reviewed selection process for the basic science application efforts to be initiated in FY 2000.

The goal of the CSET component of the SSI is to develop needed software systems, to deploy these systems into the DOE computing infrastructure, to support users, and to conduct the needed research to address future problems, all with close involvement of the applications scientists and the computer systems providers. CSET teams will also work closely with the vendor community to ensure that needed

capabilities are incorporated into products, systems, and services. Working with the university research community, CSET teams will ensure a steady flow of young researchers into the field and will form long-term collaborations in the areas needed by scientific simulation. CSET teams will also establish natural partnerships with the DOE ASCI program and with the NSF Partnerships for Advanced Computational Infrastructure (PACI) program, which are addressing complementary goals. These partnerships could result in the joint funding of research and development activities and joint deployment of infrastructure capabilities. CSET is a critical crosscutting activity for the Scientific Simulation Initiative — one that will enable the program to accomplish far more than if applications teams were required to develop all the necessary software and infrastructure themselves. Through the sharing of common tools and technologies, the CSET activities will dramatically improve the cost-effectiveness of the SSI. In order to accomplish these goals, CSET must support a vigorous research program as well as significant development and software deployment activities to address the following critical issues.

First, despite considerable progress during the past ten years in making massively parallel computer systems usable for applications, much remains to be done. Computer systems targeted for SSI will scale from approximately 1,000 nodes today to 5,000 or 10,000 nodes for systems in 2004. This scaling will require substantial improvements in parallel computing tools, parallel I/O (input/output) systems, data management, algorithms, and program libraries. Not only will the number of compute nodes increase, but the nodes themselves will become more complex, as systems designers are forced to introduce more layers of memory hierarchy to maintain performance and develop new hardware features to support rapid communication and synchronization. The end result five years from now will be hardware systems that, while showing their roots in today's systems, will be substantially different and substantially more complex and therefore more challenging to exploit for high performance.

Second, because applications software systems typically outlive hardware by an order of magnitude (i.e., computer hardware typically has a useful lifetime of three years, whereas large-scale scientific codes last one to two decades), new software must be designed for machines not only for the near future but for the next decade. This effort will require close working relationships between code developers from the applications areas and computer scientists who are involved in next-generation systems and architecture design.

Third, the applications themselves are getting more complex. They are incorporating more sophisticated physical models, are using advanced numerical techniques (e.g., adaptive mesh refinement, unstructured and implicit solvers, and hierarchical methods), and are beginning to be combined into large-scale "simulation systems" that include the linkage of two or more previously stand alone models (e.g., ocean-atmosphere-biosphere or fluid-structures-chemistry). Furthermore, in some cases these models are being driven by an optimization environment to enable them to address policy questions.

Finally, in addition to rapidly changing hardware and applications targets, the user and development community is also evolving. No longer can groups afford to work only with local collaborators or to use only locally available hardware and software resources. The development and user environments of the near future will need to enable ubiquitous collaboration and distributed computing capabilities to address these complexities. As the applications codes themselves become more interdisciplinary, so too will the teams that write them. As the need to incorporate deep knowledge of computer science techniques into future codes increases, so will the need to form long-term collaborations among applications scientists and computer scientists and mathematicians. These unavoidable trends mean that the problem-solving

environments of the future will need to support human-to-human interactions as easily as we support computer to computer interactions today.

The management of SSI Computing and Communications facilities also poses challenges. Specifying, developing procurement specifications for, and finally delivering installed SSI facilities require great skill and experience. All of the facilities must work together because the performance of the system is determined by the slowest component. The SSI facilities must provide the linkage between the computing environment developed for the user and the systems management and systems integration required to support these environments. The SSI requires three distinct types of computing facilities: computing, networking and associated supporting hardware.

DOE will establish an open solicitation process that seeks the widest participation in establishing its terascale computing infrastructure, including competition among national laboratories, universities, and industry, based on their qualifications. The sites for the major teraflop computers will be selected through peer-reviewed competition. A number of considerations are important in selecting organizations to manage and locations at which to site SSI facilities. One of the most important is an expertise to perform the necessary computing systems integration into the existing nationwide DOE Office of Science computing infrastructure. These large-scale systems have requirements for scalable systems management that will enable relatively small systems administration teams to manage systems with 1000's of nodes and 10,000's of processors. These systems also need to be tightly integrated with data storage environments, mass stores, visualization environments, and distributed computing frameworks. Other considerations include incremental site preparation costs, the cost of connecting at very high speed to the networking infrastructure, and site financial leverage in providing operational support to the facility.

Finally, MICS will manage the open peer reviewed competition among basic science disciplines to select a small number for initial inclusion in the initiative. These applications will be chosen from throughout the portfolio of the Office of Science based on the scientific and technical merit of the proposals; the importance to DOE missions; and the readiness of the area and the associated scientific communities to move quickly to terascale computers.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Mathematical, Computational, and Computer Sciences Research	47,857	51,560	71,407	+19,847	+38.5%
Advanced Computation, Communications Research and Associated Activities	76,169	83,800	108,682	+24,882	+29.7%
SBIR/STTR	0	3,474	4,486	+1,012	+29.1%
Total, Mathematical, Information, and Computational Sciences	124,026	138,834	184,575	+45,741	+32.9%

54 201 00 44

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Mathematical, Computational, and Computer Sciences Research

- **Applied Mathematics:** Research on the underlying mathematical understanding and numerical algorithms to enable effective description and prediction of physical systems. This activity supports research at DOE laboratories, universities, and private companies to provide the DOE laboratory community and the wider national scientific and engineering communities with the most powerful and effective mathematical and computational tools for modeling, analyzing, and simulating complex phenomena in the core disciplinary and technology areas of DOE. Laboratory, academic, and industry researchers supported by the program work at laboratory sites with DOE mentors. To accomplish its goals, the program supports research in a number of areas including: **Mathematical Physics** including string theory, superstring theory, geometry of space-time, and quantum effects; **Ordinary and Partial Differential Equations** including numerical methods, high performance algorithms, massively parallel algorithms, distributed computing, novel gridding schemes, numerical linear algebra, iterative methods, sparse solvers, and dense solvers; **Control Theory** including differential-algebraic systems, order reduction, queuing theory; **Shock Wave Theory** including hyperbolic systems, multipole expansions, mixed elliptic-hyperbolic problems, and wavelet transforms; **Fluid Dynamics** including compressible, incompressible, and reacting flows, turbulence modeling, and multiphase flows; **Dynamical Systems** including chaos-theory and control, and bifurcation theory; **Programming and Optimization** including linear and nonlinear programming, interior-point methods, and discrete and integer programming; and **Geometric and Symbolic Computing** including minimal surfaces and automated theorem proving. The FY 2000 budget includes the continuation of work initiated in FY 1999

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
to develop the mathematical basis for modeling and simulating complex stochastic phenomena of the type that arise in vital DOE areas such as global climate modeling, environmental remediation, and stockpile stewardship. CTR will provide opportunities for college faculty and students to spend time at DOE laboratories, to participate in world-class research projects. Faculty/Student Science Teams will visit DOE labs during the academic/summer semesters, be involved in conducting research, writing proposals, utilizing technology and pursuing technical or scientific careers. Primary goals of the Science Teams are to build long-term partnerships among DOE laboratories and provide faculty/students with a deeper understanding of DOE science associated needs for research and development. Funds will be provided to pay for faculty/student stipends, travel, housing, and subsidizing laboratory scientists' time for this activity ($1,947,000).	23,576	25,232	27,179
■ **Computer Science:** Research in computer science to enable large scientific applications. This activity supports research in two general areas: the underlying software to enable applications to make effective use of computers with hundreds or thousands of processors as well as computers that are located at different sites; and large scale data management and visualization. The first area includes research in protocols for message passing and parallel input/output (IO) as well as tools to monitor the performance of scientific applications. The second area includes research in effective techniques for retrieving data with complex internal structure from massive data archives that may be geographically distributed as well as advanced techniques for visualizing very large scale scientific data.	14,000	14,000	14,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Advanced Computing Software Tools:** R&D to develop the results of fundamental research in applied mathematics and computer science into an integrated set of tools that can be used by scientists in various disciplines to develop high performance scientific applications (e.g., to simulate the behavior of materials) that will have a useful life spanning many generations of computer hardware. These tools will include capabilities for representing complex geometries, solving diverse numerical equations, simplifying multi-language parallel execution, evaluating and enhancing code performance, and dynamically steering calculations during execution. This effort began as a part of the DOE2000 initiative.	5,000	5,000	5,000
■ **Scientific Applications Pilot Projects:** R&D to apply computational techniques and tools developed in the Advanced Computing Software Tools effort to basic research problems in order to test the usefulness of current advanced computing research, transfer the results of this research to the scientific disciplines, and help define promising areas for future research. Examples of pilot projects include: research in simulations of the earth's climate; research in the fundamental structure and properties of magnetic materials; creation of advanced tools to understand the chemistry of actinides; and partnerships with experimental disciplines such as high energy and nuclear physics, human genomics, and crystallography to improve the ability of these disciplines to manage and analyze the petabytes of data (that would fill the hard disks of millions of today's PC's) produced by their experiments and simulations. These efforts represent the evolution of the Grand Challenge projects that were initiated as part of DOE's component of the Federal High Performance Computing and Communications program, which started in FY 1991. These projects will now be phased out in an orderly manner	5,281	7,328	3,785

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Scientific Simulation Initiative (SSI) Algorithms, Models, Methods and Libraries:** New classes of algorithms will need to be developed to effectively utilize SSI systems. SSI computers will be characterized by large-scale distributed shared memory, with deep memory hierarchies. To achieve maximum performance, new hierarchical algorithms and methods need to be developed that can take advantage of these architecture features. In addition, mathematical techniques that are already under development may yield fundamentally new ways to conduct individual simulations and ensemble calculations, improving predictability and our understanding of errors in computations. New strategies for building mathematical software based on components are also likely to make a large contribution to programmer effectiveness for the SSI applications.	0	0	2,947
■ **SSI Problem Solving Environments and Tools (PSET):** A major challenge for CSET will be the development of an integrated problem solving environment that supports the rapid construction and testing of applications codes. These environments need to support the most advanced parallel tools and libraries and enable users to collaborate on the development of codes, planning runs, debugging and performance analysis. PSET systems will also allow the user to monitor jobs visually and to steer computations from their desktop and to share these results with others.	0	0	2,920
■ **SSI Distributed Computing and Collaboration Technology (DCCT):** Many SSI applications teams will be distributed around the country. They need the capability to work together not only to develop codes, but also to share data, design experiments, plan work and jointly conduct long running jobs. DCCT will support the creation of a software technology base to support SSI simulations that will enable users to run jobs at remote sites and migrate data from one site to another. Distributed computing technology will enable users to begin to see a single logical view of the DOE computing infrastructure and request, coordinate, and manage resources from multiple sites to attack a problem.	0	0	2,920

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **SSI Visualization and Data Management Systems:** Simulations run on 10 teraflop or 40 teraflop class computers will generate 10's or 100's of Terabytes of output per job. Advanced scientific visualization and analysis systems will be needed to translate this mass of output to human understanding. Some data will best be analyzed visually while other data will need to be post-processed to extract features and statistics. Both forms of analysis will need sophisticated data management systems to enable the rapid and facile manipulation of datasets. Large-scale databases will be used to manage data from simulations and advanced data organization techniques will support rapid and hierarchical traversals of data providing the user the possibility of flying through data in real-time. Associated capital requirements for large scale data management and visualization testbeds are also supported	0	0	6,815
■ **SSI Basic Science Applications:** Support two basic science SSI application efforts. These efforts will be selected through a competitive process that evaluates the scientific and technical merit of the proposed project, the potential of the proposed work to make significant new science possible, and the readiness of the scientific discipline and associated scientific community to make early use of terascale computers.	0	0	5,841
Total Mathematical, Computational, and Computer Sciences Research	47,857	51,560	71,407
Advanced Computation, Communications Research, and Associated Activities			
■ **Networking:** Research in high performance computer networks and information surety required to support high performance computer applications — protocols for high performance networks, methods for measuring the performance of high performance networks, and software to enable high speed connections between high performance computers and both local area and wide area networks. In addition, this activity supports research in network protocols to enable applications to request, and be guaranteed, certain levels of network capability.	5,987	4,500	4,500

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ **Collaboratory Tools:** R&D to develop the results of fundamental research in computer science and networking into an integrated set of tools to enable scientists to remotely access and control facilities and share data in real time. In order to accomplish this goal a number of issues are under investigation including: definition and demonstration of a general and modular security architecture that can protect open network applications such as control of experimental devices; development of a modular electronic notebook prototype that can be used in a number of desktop computer environments to enable the sharing of scientific results, data from scientific instruments, and design of scientific procedures; development of tools to manage distributed collaborations such as tools for managing multipoint videoconferences ranging from the current "whoever is speaking has the floor" to more formal meetings where a meeting leader controls who has the "floor"; development of advanced techniques for managing and returning to the electronic record of the collaboration; and exploration of techniques such as virtual reality to enable large groups to work together effectively at a distance. This effort began as a part of the DOE2000 initiative.	3,000	3,000	3,000
■ **National Collaboratory Pilot Projects:** R&D to test, validate, and apply collaboratory tools in partnership with other DOE programs. The two pilot projects are: (1) the Materials MicroCharacterization Collaboratory, a partnership with Basic Energy Sciences and Energy Efficiency and Renewable Energy to provide remote access to facilities located at Oak Ridge National Laboratory, Lawrence Berkeley National Laboratory, Argonne National Laboratory, and the National Institute of Standards and Technology, and the University of Illinois for electron beam microcharacterization of materials; and (2) the Diesel Combustion Collaboratory, a partnership with Basic Energy Sciences, Energy Efficiency and Renewable Energy, and three U.S. manufacturers of diesel engines, to link the research and researchers at Sandia National Laboratory, Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and the University of Wisconsin with efforts and researchers at industrial			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
laboratories in Indiana and Michigan to develop the next generation of clean diesel engines. This effort began as a part of the DOE2000 initiative. These partnerships with the scientific disciplines and the technology programs enable MICS to be particularly successful in bringing advances in advanced computing research to bear on important problems faced by scientists in other disciplines. In addition, they provide important feedback to the researchers on what problems are most important.	3,000	3,000	3,000
■ **National Energy Research Scientific Computing Center (NERSC):** NERSC, located at LBNL, provides high performance computing for investigators supported by the Office of Science. The Center serves 3,500 users working on about 700 projects; 35 percent of users are university based, 60 percent are in National Laboratories, and 5 percent are in industry. NERSC provides a spectrum of supercomputers offering a range of high performance computing resources and associated software support. These computational resources will be integrated by a common high performance file storage system that facilitates interdisciplinary collaborations. This file storage system, the Archival Systems Upgrade, is a major item of equipment in FY 2000 with a total estimated cost of $2,000,000.	26,500	26,500	27,500
■ **Advanced Computing Research Facilities (ACRFs):** ACRFs support advanced computational hardware testbeds for scientific application pilot projects and fundamental research in applied mathematics and computer science. Because many of the issues to be investigated only appear in the computer systems at significantly larger scale than the computer manufacturers' commercial design point, these facilities must procure and develop software to manage and make useful the largest scale systems that can be afforded. In addition, the ACRFs, taken together, must have a full range of different computer architectures to enable comparison and reduce overall program risk. These all involve significant research efforts, often in partnership with the vendors to resolve issues including operating system stability and performance, system manageability and scheduling, fault tolerance and recovery, and details of the interprocessor communications network.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Therefore, all of these systems are managed as research programs and not as information technology investments. ACRFs are located at Los Alamos National Laboratory (Nirvana Blue partnership with the DOE Biological and Environmental Research (BER) program and Defense Programs (DP), based on SGI/Cray Technology); Argonne National Laboratory (IBM-SP); and Lawrence Berkeley National Laboratory (SGI/Cray T3E and Next Generation procurement). Related capital equipment needs such as high speed disk storage systems, archival data storage systems and high performance visualization hardware are also supported. The ACRFs represent the evolution of the High Performance Computing Research Centers that DOE initiated as a part of the Federal High Performance Computing and Communications initiative.	22,895	17,411	11,876
▪ **Energy Sciences Network (ESnet):** ESnet provides worldwide access to the Office of Science facilities, including: advanced light sources; neutron sources; particle accelerators; fusion reactors; spectrometers; ACRFs; and other leading-edge science instruments and facilities. ESnet provides the communications fabric that links DOE researchers to one another and forms the basis for fundamental research in networking, enabling R&D in collaboratory tools, and applications testbeds such as the national collaboratory pilot projects. To provide these facilities, ESnet management at LBNL contracts with commercial vendors for advanced communications services including Asynchronous Transfer Mode (ATM) and Wave Division Multiplexing (WDM). ESnet management provides system integration to provide a uniform interface to these services for DOE laboratories. In addition, ESnet management is responsible for the interfaces between the network fabric it provides and the worldwide Internet including the National Science Foundations's very high performance backbone network service that provides high performance connections to many research universities. One reason that ESnet, in the words of the 1998 external review committee, is able to provide the capabilities and services to its users "at significantly lower budgets than other			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
agencies" is its management structure with strong user and site coordination committees. This management structure is built on DOE's experience in operating large user facilities. Related capital equipment needs are also supported such as high speed network routers, ATM switches, and network management and testing equipment.	14,787	14,787	14,787
■ **Next Generation Internet (NGI):** DOE's program will focus on developing, testing and validating the networking technologies needed to enable wide area, data intensive and collaborative computing. The program, which began in FY 1999, has three subcomponents. First, research in basic underlying technologies such as: protocols and techniques for coordinating multiple, heterogeneous network-attached devices; congestion and flow control techniques; multi-gigabit end system interfaces, analyzers, and switches along with mechanisms to reduce operating system overhead for data transfers; mechanisms to provide application controlled Class of Service and Quality of Service; and middleware to provide Internet Protocol (IP), ATM, and WDM resource and admission control, scheduling, management, prioritization, accounting, and debugging. Second, Application-Network Technology-Network Testbed Partnerships to: integrate and test advanced network R&D and testbeds with DOE mission applications such as HENP Data, remote visualization of simulation results, advanced collaboratories; define what network & middleware services are required to permit these applications to effectively run over wide area networks; define the features and the API's necessary to allow the application and middleware to communicate; integrate local and wide-area network technologies to create distributed collaboratories; and integrate Differentiated Services, or other Quality of Service functions, into wide area networks and production network testbeds without compromising the existing production network services. Third, DOE-University Technology Testbeds focused on: R&D to implement advanced network services across multiple, interconnected networks; deployment of advanced differentiated services technology			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
across autonomous networks when priority flow represents a significant fraction of the available capability; development and testing of advanced tools to manage "peering" of networks with advanced services; cross-domain implementations of security and authentication technologies; development and testing of network performance monitoring and characterization software which applications can use in this environment to optimize their performance; and development of policy frameworks and specification languages to facilitate the negotiation of capabilities across autonomous system boundaries.	0	14,602	14,602
■ **SSI Research Computing Facilities and Network Infrastructure:** Initiation of a procurement for one 5 Teraflop-class computer system and associated data archive facilities in the third quarter of FY 2000. This activity includes not only procurement of the computing and storage systems but also the associated operational costs and facility improvements which will be required. This process will have two distinct stages. DOE will establish an open solicitation process that seeks the widest participation in establishing its terascale computing infrastructure, including competition among national laboratories, universities, and industry, based on their qualifications. The sites for the major teraflop computers will be selected through peer-reviewed competition. A number of considerations are important in selecting organizations to manage and locations at which to site SSI facilities. One of the most important is an expertise to perform the necessary computing systems integration into the existing nationwide DOE Office of Science computing infrastructure. These large-scale systems have requirements for scalable systems management that will enable relatively small systems administration teams to manage systems with 1000's of nodes and 10,000's of processors. These systems also need to be tightly integrated with data storage environments, mass stores, visualization environments, and distributed computing frameworks. Other considerations include incremental site preparation costs, the cost of connecting at very high speed to the networking infrastructure, and site			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
financial leverage in providing operational support to the facility. After the site is selected, the site must conduct an open competition to procure the 5 teraflop-class computer system as well as the other supporting computing and data storage systems. This activity also includes significant enhancements to the ESnet infrastructure to support access to the SSI computer facility by SSI scientists. SSI computing facilities and remote sites require very high performance network facilities to be effective. Planning estimates indicate that aggregate network data flow into and out of SSI facilities must be near 100 gigabits/second, almost 200 times faster than the fastest links on today's ESnet. In addition, remote sites with major participation in SSI science areas and CSET require significantly greater network capabilities than ESnet can provide within its current funding profile. Enhanced network services will be provided to remote sites on the basis of need and the resources available. The balance of funding between the computer facility and enhanced networking will be determined by detailed review after the selection of the computer facility site. However, preliminary estimates indicate that the computer facility will require between 80 percent and 85 percent of the funding in this activity. Associated requirements for capital equipment and GPP funding are included here..	0	0	29,417
Total, Advanced Computation, Communications Research, and Associated Activities	76,169	83,800	108,682
SBIR/STTR			
■ In FY 1998, $3,004,000 and $180,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	0	3,474	4,486
Total, Mathematical, Information, and Computational Sciences	124,026	138,834	184,575

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Mathematical, Computational, and Computer Sciences Research	
■ Increase in funding will provide opportunities for college faculty and students to spend time at DOE laboratories to participate in world class research projects.	+1,947
■ Close out all scientific application pilot projects in an orderly fashion in mid-FY 2000.	-3,543
■ Initiate support for SSI's Computational Sciences and Enabling Technology and Basic Science Applications.	+21,443
Total, Mathematical, Computational, and Computer Sciences Research	+19,847
Advanced Computation, Communications Research, and Associated Activities	
■ Cost-of-living increase for operations of NERSC.	+1,000
■ Reduced support for ACRF's including termination of the ACRF at ANL in mid-FY 2000.	-5,535
■ Support for SSI's Research Computing Facilities and Network Infrastructure.	+29,417
Total, Advanced Computation, Communications Research, and Associated Activities	+24,882
SBIR/STTR	
■ Increase in SBIR/STTR due to increase in operating expenses.	+1,012
Total Funding Change, Mathematical, Information, and Computational Sciences	+45,741

Laboratory Technology Research

Mission Supporting Goals and Objectives

The mission of the Laboratory Technology Research (LTR) subprogram is to support high risk, energy related research that advances science and technology to enable applications that could significantly impact the Nation's energy economy. LTR fosters the production of research results motivated by a practical energy payoff through cost-shared collaborations between the Office of Science (SC) laboratories and industry.

An important component of the Department's strategic goals is to ensure that the United States maintains its leadership in science and technology. LTR is the lead program in the Office of Science for leveraging science and technology to advance understanding and to promote our country's economic competitiveness through cost-shared partnerships with the private sector.

The National Laboratories under the stewardship of the Office of Science conduct research in a variety of scientific and technical fields and operate unique scientific facilities. Viewed as a system, these ten laboratories — Ames Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, Stanford Linear Accelerator Center, and Thomas Jefferson National Accelerator Facility — offer a comprehensive resource for research collaborations. The major component of the LTR research portfolio consists of investments at these laboratories to conduct research that benefits all major stakeholders — the DOE, the industrial collaborators, and the Nation. These investments are further leveraged by the participation of an industry partner, using Cooperative Research and Development Agreements (CRADAs). Another LTR program component provides rapid access by small business to the research capabilities at the SC laboratories through agile partnership mechanisms including personnel exchanges and technical consultations with small business. The LTR subprogram currently emphasizes three critical areas of DOE mission-related research: advanced materials processing and utilization, intelligent processes and controls, and energy-related applications of biotechnology.

Performance Measures

- Initiate about 7 Laboratory Technology Research projects that address the Department's top priorities for science and technology, through cost-shared research partnerships with industry.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Laboratory Technology Research	14,983	12,751	13,921	+1,170	+9.2%
SBIR/STTR	0	423	379	-44	-10.4%
Congressional Direction	396	2,968	0	-2,968	-100.0%
Total, Laboratory Technology Research	15,379	16,142	14,300	-1,842	-11.4%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Laboratory Technology Research

- This activity supports research to advance the fundamental science and technology at the Office of Science laboratories toward innovative energy applications. Through CRADAs, the SC laboratories enter into cost-shared research partnerships with industry, typically for a period of three years, to explore energy applications of research advances in areas of mission relevance to both parties. In FY 2000, about 7 new Laboratory Technology Research projects will be initiated. The research portfolio consists of approximately 100 projects and emphasizes the following topics: advanced materials processing and utilization, intelligent processes and controls, and energy-related applications of biotechnology. Efforts underway include the exploration of (1) a process to produce ultra-smooth diamond coatings on rotating and sliding mechanical parts in order to reduce energy consumption, improve product reliability, and reduce toxic emissions to the environment; (2) a new family of wireless, single-chip luminescent-sensing devices for use in monitoring of environmental pollutants and in high throughput screening of new therapeutic drugs; and (3) an x-ray imaging module, consisting of a cadmium zinc telluride detector and an application-specific integrated circuit, to determine bone density in the diagnosis of osteoporosis by performing whole

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
body scans with lower dose rate and higher resolution. A small but important component of this activity provides industry, particularly small businesses, with rapid access to the unique research capabilities and resources at the SC laboratories. These research efforts are usually supported for a few months to quantify the energy benefit of a specific problem posed by an industry. Recent projects supported the development of (1) a low-temperature oxygen plasma technology for remediation of soils contaminated by pesticides and other chemicals; (2) a new class of fluids that can transfer heat more efficiently than conventional fluids and offer several energy-related benefits, including decreased pumping power needs and reduction in required heat exchanger size, for use in the transportation, electronics, and textile industries; and (3) improved catalytic materials, which can lead to substantial energy savings in petroleum refining and chemical manufacturing.	14,983	12,751	13,921
SBIR/STTR			
■ In FY 1998, $391,000 and $24,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	0	423	379
Congressional Direction			
■ Funds the University of Southwestern Louisiana (per FY 1997 Congressional Direction).	396	2,968	0
Total, Laboratory Technology Research	15,379	16,142	14,300

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Laboratory Technology Research	
■ Increase in multiyear technology research partnership projects.	+1,170
SBIR/STTR	
■ Decrease in SBIR/STTR due to decrease in operating expenses.	-44
Congressional Direction	
■ Reduction is due to completion of Congressionally directed projects	-2,968
Total Funding Change, Laboratory Technology Research.	-1,842

Advanced Energy Projects

Mission Supporting Goals and Objectives:

The Advanced Energy Projects (AEP) subprogram funded research that established the feasibility of novel, energy-related concepts that span the Department's energy mission and goals. Funded projects were based on innovative ideas that spanned multiple scientific and technical disciplines and did not fit into any other DOE program area. A common theme for each project was the initial linkage of new research results to an energy application with a potentially significant payoff. Typically, AEP supported projects up to a level of about $250,000 per year for a period of about 3 years. Projects were selected from proposals submitted by universities and national laboratories. Funding criteria emphasized scientific merit as judged by external peer review.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Advanced Energy Projects	7,374	2,429	0	-2,429	-100.0%
SBIR/STTR	0	66	0	-66	-100.0%
Total, Advanced Energy Projects	7,374	2,495	0	-2,495	-100.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Advanced Energy Projects			
■ Support for high-risk, high-payoff research at universities and national laboratories established the feasibility of novel energy related concepts that were at an early stage of scientific definition. Final funds for these projects were provided in FY 1999.	7,374	2,429	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SBIR/STTR			
■ In FY 1998, $187,000 and $11,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 amount is the estimated requirement for the continuation of the SBIR and STTR programs.	0	66	0
Total, Advanced Energy Projects	7,374	2,495	0

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Advanced Energy Projects	
■ Termination of existing AEP program. The decision to terminate the AEP subprogram resulted from a change in CTR program priorities	-2,429
SBIR/STTR	
■ Decrease in SBIR/STTR due to termination of the program.	-66
Total Funding Change, Advanced Energy Projects	-2,495

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	397	70	4,000	+3,930	+5,614.3%
Capital Equipment (total)	6,912	6,275	11,275	+5,000	+79.7%
Total, Capital Operating Expense	7,309	6,345	15,275	+8,930	+140.7%

Major Items of Equipment (*TEC $2 million or greater*)

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998	FY 1999	FY 2000	Accept-ance Date
Archival Systems Upgrade - LBNL	2,000	0	0	0	2,000	FY 2002
Total, Major Items of Equipment		0	0	0	2,000	

Energy Research Analyses

Program Mission

The mission of the Energy Research Analyses (ERA) program is to evaluate the quality and impact of Department of Energy research programs and projects.

Program Goal

Provide Department of Energy program managers and senior managers with objective assessments of research projects and programs in order to evaluate the quality and impact of these efforts, to identify undesirable duplications and gaps, and to provide analysis of key technical issues in support of long range energy research planning, science and technology planning, and technical and performance evaluation of departmental programs and objectives.

Program Objectives

- *To Provide The Basis For Judgments on The Quality of Research And Its Impact.* Using merit review with peer evaluation, provide departmental program managers and their superiors with detailed information about the technical strengths and weaknesses of projects that comprise the research and development (R&D) program as a basis for judgment of the quality of the research and its impact.

- *To Provide Independent Views of Future R&D Needs in Areas of Interest to The Department.* Evaluate the status of science and technology areas of potential importance to the Department's mission, and to lay out appropriate fundamental and applied research and development to hasten the advance towards potential energy applications.

- *To Develop Strategic And Performance Plans.* Use advice from outside experts, advisory committees, departmental managers, national laboratory managers, industrial scientists and managers, and officials of other government agencies to formulate strategic and performance plans for the Office of Science and for the Science and Technology business line of the Department.

- *To Contribute to DOE And Interagency Program Analysis And Planning For Government Science And Technology.* Participate in committees, task forces, working groups, and workshops of the Department of Energy and organizations such as the National Science and Technology Council, the National Science Foundation, the National Academy of Sciences, and private sector organizations such as the Industrial Research Institute, and the Electric Power Research Institute.

Performance Measures

- Quality and value of peer review evaluations, as indicated by satisfaction of investigators and program managers and actions taken to improve or replace projects that have significant shortcomings, and to capitalize on the strengths of stronger projects.
- Satisfaction by customer program managers with assessments of science and technology needs, as indicated by changes or additions to make DOE programs and projects more productive and relevant to DOE missions.
- Quality and acceptance of strategic and performance plans, as indicated by their use by the Director of the Office of Science and by program offices in multi-year program planning, program management, and in effectively justifying programs.
- Influence on government science and technology planning and analysis, as indicated by contributions to DOE, interagency, and outside recommendations on science policies and plans.

Significant Accomplishments and Program Shifts

Energy Research Analyses

- Independent peer reviews verified the quality and relevance of over 100 DOE projects and tasks in FY 1997. These levels of effort will be scaled down through FY 2000 to accommodate the reduced funding.
- A new Office of Science Strategic Plan will be completed in FY 1999 that will guide the Office of Science into the first quarter of the next century.
- A Department of Energy Science Facilities Roadmap will be completed in FY 1999 that will optimize the Nation's investments in the Department's scientific facilities into the first quarter of the next century.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Energy Research Analyses					
Energy Research Analyses	1,434	1,000	0	1,000	1,000
Use of Prior Year Balances	-144 [1]	-92 [a]	0	-92 [a]	0
Total, Energy Research Analyses	1,290 [2]	908	0	908	1,000

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Operations Office					
Oak Ridge National Laboratory	665	400	400	0	0.0%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	100	0	0	0	0.0%
Richland Operations Office					
Pacific Northwest National Laboratory	0	350	250	-100	-28.6%
All Other Sites [3]	669	250	350	+100	+40.0%
Subtotal, Energy Research Analyses	1,434	1,000	1,000	0	0.0%
Use of Prior Year Balances	-144[a]	-92 [a]	0	+92 [a]	+100.0%
Total, Energy Research Analyses	1,290	908	1,000	+92	+10.1%

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

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[1] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[2] Excludes $36,000 which has been transferred to the SBIR program and $2,000 which has been transferred to the STTR program.

[3] Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

Site Description

Oak Ridge National Laboratory

Oak Ridge National Laboratory is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. Oak Ridge National Laboratory supports the Energy Research Analyses program in technical reviews of Department research programs. This activity includes technical support for peer review assessments and other studies and workshops as requested.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is a Multiprogram Laboratory located on a 640 acre site at the Department's Hanford site in Richland, Washington. Pacific Northwest National Laboratory carries out research in the areas of technical planning and economic analysis to contribute to the Energy Research Analyses program's formulation of long term plans and science policy. This activity includes assessments of international basic energy science programs and private sector investments in energy R&D.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory is a Multiprogram Laboratory located in Berkeley, California. The Laboratory is on a 200 acre site adjacent to the Berkeley campus of the University of California. This activity contributes to the Energy Research Analyses program's formulation of long-term plans and science policy.

All Other Sites

This line includes funding of research awaiting distribution pending finalization of program office detailed planning.

Energy Research Analyses

Mission Supporting Goals and Objectives

The Energy Research Analyses (ERA) program assesses research projects and programs in order to judge the significance of these efforts and to identify undesirable duplications and gaps. Peer reviews of individual research projects using outside experts are performed. Technical assessments to determine the direction of future research and state-of-the-science reviews are also performed. The program also provides analyses in support of long range energy research planning, science and technology planning, and technical evaluation of DOE programs and objectives.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Energy Research Analyses	1,434	973	973	0	0.0%
SBIR/STTR	0	27	27	0	0.0%
Total, Energy Research Analyses	1,434	1,000	1,000	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Energy Research Analyses			
■ Evaluate the quality and relevance of research projects in Science, Fossil Energy, and Energy Efficiency by independent peer reviews and assess additional technical needs in Science, Fossil Energy, and Energy Efficiency (e.g., advanced composite materials). Evaluate critical planning and policy issues of DOE science and technology through reviews by expert groups outside the Department such as the National Academy of Sciences and the JASON group.	1,434	973	973
SBIR/STTR			
■ In FY 1998, $36,000 and $2,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts shown are the estimated requirement for the continuation of the SBIR and STTR programs.	0	27	27
Total, Energy Research Analyses	1,434	1,000	1,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ There are no funding changes from FY 1999 to FY 2000 for Energy Research Analyses.	0
Total Funding Change, Energy Research Analyses	0

Multiprogram Energy Laboratories - Facilities Support

Program Mission

The Multiprogram Energy Laboratories - Facilities Support (MEL-FS) program provides line item construction funding (i.e., projects with a total estimated cost of $5,000,000 or above) for general purpose facilities to support the infrastructure of the five Office of Science multiprogram national laboratories. These are: Argonne National Laboratory - East (ANL-E), Brookhaven National Laboratory (BNL), Lawrence Berkeley National Laboratory (LBNL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL). These laboratories are government-owned, contractor-operated (GOCO) and have over 1,100 buildings with 14.3 million gross square feet of space and an estimated replacement value of over $9,000,000,000. Total operating funding for these laboratories is over $3,000,000,000 a year. The Office of Science manages this program to provide a comprehensive, prioritized and equitable approach to its stewardship responsibility for the general purpose support infrastructure of these laboratories.

The program also provides funding for Payments in Lieu of Taxes (PILT) as authorized by the Atomic Energy Act of 1954, as amended. These discretionary payments are made to state or local governments where the Department or its predecessor agencies have acquired property previously subject to state or local taxation.

Program Goal

To ensure that the support facilities at the multiprogram laboratories can meet the Department's research needs in a safe, environmentally sound, and cost-effective manner primarily by refurbishing or replacing deteriorated, outmoded, unsafe, and inefficient general purpose infrastructure.

Program Objectives

- To correct Environment, Safety and Health (ES&H) inadequacies.
- To reduce risk of operational interruptions due to failed support systems.
- To provide cost effective operations and reduce maintenance costs.
- To provide quality space for multiprogram research and support activities.
- To preserve the government investment in the physical plant of the laboratories.
- To promote performance-based infrastructure management.

Performance Measures

Performance measures related to the MEL-FS program are continuously being refined to ensure that they: 1) incorporate external/internal customer inputs; 2) drive performance; 3) address the strategic plan; and 4) focus on the effectiveness of the laboratory system. Current performance measures include:

- Support of line item construction funding to reduce risk, ensure continuity of operations, avoid or reduce costs and increase productivity.

  Expectation: Fund highest priority needs based on scoring from Life Cycle Asset Management (LCAM) Cost-Risk-Impact Matrix.

- Overall condition of laboratory buildings.

  Expectation: Increase the percentage of facilities rated adequate.

- Excellence in project management.

  Expectation: Increase the percentage of projects completed within baseline cost and schedule.

Significant Accomplishments and Program Shifts

- Progress in Line Item Projects - Two projects are scheduled for physical completion in FY 2000: the Building Electrical Services Upgrade- Phase I at ANL-E and the Electrical Services Rehabilitation-Phase IV at LBNL.
- Continue the Payments in Lieu of Taxes (PILT) for ANL-E and BNL.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Multiprogram Energy Laboratories-Facilities Support					
Multiprogram Energy Laboratories-Facilities Support	21,247	21,260	0	21,260	21,260
Use of Prior Year Balances	-336[a]	-13[a]	0	-13[a]	0
Total, Multiprogram Energy Laboratories-Facilities Support	20,911	21,247	0	21,247	21,260

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory	10,892	7,359	5,246	-2,113	-28.7%
Brookhaven National Laboratory	568	2,239	7,775	+5,536	+247.2%
Total, Chicago Operations Office	11,460	9,598	13,021	+3,423	+35.7%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	2,400	4,854	6,133	+1,279	+26.3%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	7,387	6,808	2,106	-4,702	-69.1%
Subtotal, Multiprogram Energy Laboratories - Facilities Support	21,247	21,260	21,260	0	0.0%
Use of Prior Year Balances	-336[a]	-13[a]	0	+13	+100.0%
Total, Multiprogram Energy Laboratories - Facilities Support	20,911	21,247	21,260	+13	+0.1%

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Site Description

Argonne National Laboratory - East

Argonne National Laboratory - East (ANL-E) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. The laboratory consists of 122 facilities, 4.6 million gross square feet of space, with the average age of the facilities being 30 years. Approximately 29 percent of the space is considered adequate, while the remainder needs rehabilitation or replacement/demolition. The MEL-FS program is currently funding or proposes funding the following projects:

- MEL-001-03 - Electrical Systems Upgrade, Phase III (TEC $7,620,000) Project includes upgrading transmission lines, transformers, switchgear, etc. to insure system reliability.

- MEL-001-06 - Central Supply Facility (TEC $5,900,000) - This project will consolidate operations currently dispersed throughout the site into one central location.

- MEL-001-09 Fire Safety Improvements, Phase IV (TEC $8,430,000) This proposed new start for FY 2000 will bring 30 major facilities into compliance with the Life Safety Code and the National Fire Alarm Code.

The program also provides funding for Payments in Lieu of Taxes (PILT) as authorized by the Atomic Energy Act of 1954, as amended. These discretionary payments are made to state or local governments where the Department or its predecessor agencies have acquired property previously subject to state or local taxation.

Brookhaven National Laboratory

Brookhaven National Laboratory is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. The laboratory consists of 349 facilities, 4.1 million gross square feet of space, with the average age of the facilities being 38 years. Approximately 27 percent of the space is considered adequate, while the remainder needs rehabilitation or replacement/demolition. The MEL-FS program is currently funding:

- MEL-001-04 - Electrical Systems Modifications, Phase I (TEC $5,730,000) This project will include: the replacement of and installation of new cables and underground ductbanks; the installation of a new 13.8 kV - 2.4 kV substation and replacement of other obsolete components.

- MEL-001-07 - Sanitary System Modifications, Phase III (TEC $6,500,000) This project will: replace or rehabilitate approximately 9,900 feet of existing deteriorated (8 to 20 inch) sewer piping; replace the sewage digester; connect five facilities to the sanitary system; and make other modifications to reduce discharges to the environment.

The program also provides funding for Payments in Lieu of Taxes (PILT) as authorized by the Atomic Energy Act of 1954, as amended. These discretionary payments are made to state or local governments where the Department or its predecessor agencies have acquired property previously subject to state or local taxation.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory is a Multiprogram Laboratory located in Berkeley, California. The laboratory is on a 200 acre site adjacent to the Berkeley campus branch of the University of California. The laboratory consists of 118 facilities, 1.6 million gross square feet of space, with the average age of the facilities being 34 years. Approximately 19 percent of the space is considered adequate, while the remainder needs rehabilitation or replacement/demolition. The MEL-FS program is currently funding or proposes to fund the following projects:

- MEL-001-05 - Building 77-Rehabilitation of Building Structure and Systems (TEC $8,000,000) This project will correct seismic deficiencies and refurbish and upgrade the electrical and mechanical systems to facilitate the high precision processes currently being performed in the facility.

Oak Ridge National Laboratory

Oak Ridge National Laboratory is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. The laboratory consists of 466 facilities, 3.4 million gross square feet of space, with the average age of the facilities being 36 years. Approximately 18 percent of the space is considered adequate, while the remainder needs rehabilitation or replacement/demolition. The MEL-FS program is currently funding or proposes to fund the following projects:

- 94-E-363- Roofing Improvements (TEC $16,000,000) This project is replacing the roofs on numerous facilities, thereby extending their lives significantly.

- MEL-001-08 Electrical Systems Upgrade (TEC $5,900,000) This proposed new start for FY 2000 will include: replacing overhead feeders; installing advanced protective relaying capabilities at major substations; and replacing major switchgear and transformers.

Multiprogram Energy Laboratories - Facilities Support

Mission Supporting Goals and Objectives

This subprogram supports the program's goal to ensure that the multiprogram laboratories' support facilities can meet the Department's research needs primarily by refurbishing or replacing deteriorated, outmoded, unsafe, and inefficient general purpose infrastructure. General purpose facilities are general use, service and support facilities such as administrative space, cafeterias, general office/laboratory space, utility systems, sanitary sewers, roads, etc. Less than half of the space is considered fully adequate, while the remainder needs rehabilitation or replacement/demolition. The large percentage of inadequate space reflects the age of the facilities (average age of 33 years), changing research needs that require more office space and light laboratory space, ES&H requirements and obsolete systems.

Capital investment requirements are identified in laboratory Institutional Plans which address needs through the year 2003 based on expected programmatic support. The projected needs through the period total over $320,000,000. Of this amount, 53 percent is to rehabilitate or replace buildings; 33 percent is for utility projects; and 14 percent for ES&H projects. All projects are first ranked using a prioritization model that takes into account risk, impacts, and mission need. The projects that have ES&H as the principal driver are further prioritized using the Risk Prioritization Model from the DOE ES&H and Infrastructure Management Plan process.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Purpose Facilities	10,829	10,271	15,500	+5,229	+50.9%
ES&H	10,418	9,829	4,600	-5,229	-53.2%
Infrastructure Support	0	1,160	1,160	0	0.0%
Total, Multiprogram Energy Laboratories-Facilities Support	21,247	21,260	21,260	0	0.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
General Purpose Facilities			
■ Supports the initiation of one new General Purpose Facility subproject in FY 2000, as well as the continuation of three FY 1999 subprojects under the Multiprogram Energy Laboratories Infrastructure Project (MEL-001). The FY 2000 new start is for design activities on the Electrical Systems Upgrade at ORNL ($357,000). The FY 1999 subprojects are the Central Supply Facility at ANL-E ($3,380,000); the Electrical Systems Modifications, Phase I at BNL ($3,881,000), and the Rehabilitation of Building 77 at LBNL ($6,133,000). Also supports the ongoing Roofing Improvements Project at ORNL ($1,749,000) (94-E-363) .	10,829	10,271	15,500
ES&H			
■ Supports the initiation of one new ES&H subproject in FY 2000, as well as the continuation of one FY 1998 and one FY 1999 subproject under the Multiprogram Energy Laboratories Infrastructure Project (MEL-001). The FY 2000 new start is for design activities on the Fire Safety Improvements, Phase IV at ANL-E ($400,000). The FY 1999 subproject is the Sanitary System Modifications, Phase III at BNL ($3,000,000). Also supports the completion of the Electrical Systems Upgrade, Phase III at ANL-E ($1,200,000).	10,418	9,829	4,600
Infrastructure Support			
■ Continue meeting payments in lieu of taxes assistance requirements for communities surrounding Brookhaven National Laboratory and Argonne National Laboratory-East.	0	1,160	1,160
Total, Multiprogram Energy Laboratories - Facilities Support	21,247	21,260	21,260

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Explanation of Changes

	FY 2000 vs. FY 1999 ($000)
■ There are no changes from FY 1999 to FY 2000 for the MEL-FS program.	0
Total Funding Change, Multiprogram Energy Laboratories - Facilities Support . . .	0

Capital Operating Expenses & Construction Summary

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unapprop. Balance
MEL-001 Multiprogram Energy Laboratories Infrastructure Project	N/A	N/A	7,259	14,924	18,351	19,346
94-E-363 Roofing Improvements, ORNL	16,000	5,422	3,921	4,908	1,749	0
Total, Construction		5,422	11,180	19,832	20,100	19,346

MEL-001 — Multiprogram Energy Laboratories, Infrastructure Project, Various Locations

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line in the left margin.)

Significant Changes

Two new starts in FY 2000 include: Electrical Systems Upgrade, Oak Ridge National Laboratory, and Fire Safety Improvements, Phase IV, Argonne National Laboratory-East.

1. Construction Schedule History

Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		

N/A -- See subproject details

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design and Construction			
FY 1998	7,259	7,259	2,358
FY 1999	14,924	14,924	8,955
FY 2000	18,351	18,351	18,782
FY 2001	17,316	17,316	21,210
FY 2002	2,030	2,030	8,205
FY 2003	0	0	370

3. Project Description, Justification and Scope

This project funds two types of subprojects:

- Projects to correct ES&H deficiencies including fire safety improvements, sanitary system upgrades and electrical system replacements; and
- Projects that renovate or replace inefficient and unreliable general purpose facilities (GPF) including general use, service and support facilities such as administrative space, cafeterias, utility systems, and roads.

General Purpose Facility Projects:

a. Subproject 01 - Upgrade Steam Plant, ORNL

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
5,300	0	3,400	1,900	0	0	1Q 1998 - 4Q 1999

This project will upgrade the ORNL steam plant by adding a new steam boiler of approximately 100,000 pounds per hour capacity and capable of burning both natural gas and fuel oil. The boiler will be procured with all necessary ancillary equipment, such as blowers, feedwater pumps, and controls. Suitable weather protection will be provided.

This project is needed because of the age of the five existing boilers. Three are 46 years old, one is 44 years old, and the fifth is 32 years old. The new boiler capacity will allow decreased firing time on the oldest boilers and will extend their useful life. In addition, the new boiler will improve the efficiency of the steam plant.

b. Subproject 04 - Electrical Systems Modifications, Phase I (BNL)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
5,730	0	0	849	3,881	1,000	2Q 1999 - 4Q 2001

This project is the first phase of a planned modernization and refurbishment of the Laboratory's electrical infrastructure. The project provides for the replacement of 30 to 50 year old deteriorating underground electrical cables, the addition of underground ductbanks to replace damaged portions and support new cabling, the installation of a new 13.8 kV - 2.4 kV substation to address capacity and operational problems, and the retrofitting/reconditioning of switchgear power circuit breakers.

c. Subproject 05 - Bldg. 77 - Rehabilitation of Building Structure and Systems (LBNL)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
8,000	0	0	754	6,133	1,113	2Q 1999 - 4Q 2001

This project will rehabilitate Building 77's structural system to restore lateral force resistance and arrest differential foundation settlement, and will modernize architectural, mechanical, and electrical systems. These upgrades will restore this 33 year-old, 68,000 sq.ft. building to acceptable seismic performance; provide environmental controls appropriate to precision fabrication processes; increase the reliability and maintainability of building systems; provide flexibility to meet future challenges; and extend building life by 40 years and building systems by 20 to 25 years.

d. Subproject 06 - Central Supply Facility (ANL-E)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
5,900	0	0	1,860	3,380	660	2Q 1999 - 2Q 2001

This project is a change in scope from the stand-alone facility of 39,100 sq.ft. described in the FY 1999 President's Request. The proposed facility is a 22,000 sq.ft. addition to the Transportation and Grounds Facility (Bldg. 46) along with remodeling of 3,500 sq.ft. of space in the existing Transportation and Grounds Facility. This project will result in economies and efficiencies by providing a highly efficient and cost-effective consolidated facility to meet the missions of the Materials Group and the Property Group of ANL-East and will eliminate the need for 89,630 square feet of substandard (50 year-old) space in six buildings which will be demolished (Bldgs. 4, 5, 6, 26, 27, and 28). The Materials Group receives, sorts, stores, retrieves, and distributes the majority of all materials and supplies for the Laboratory. The Property Group tags, controls, stores, and distributes excess property and precious metals for the Laboratory. This facility will contain truck docks; receiving and distribution areas; inventory control; general material storage; support and office areas; property storage; and exterior hazardous storage. This project will also eliminate 7,000 linear feet of steam supply and return lines. This proposed scope change is a result of: process improvements that have led to a reduction in on-hand inventory, relocation of DOE records storage to off-site archives; relocation of mail services; and a reduction to the labs vehicular fleet that reduced the utilization of Bldg. 46.

e. Subproject 08 - Electrical Systems Upgrade (ORNL)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
5,900	0	0	0	357	5,543	3Q 2000 - 2Q 2002

This project will replace electrical distribution feeders and upgrade transformers and switchgear feeding research facilities and primary utility support facilities throughout the Oak Ridge National Laboratory (ORNL) complex. It will also provide advanced protective relaying and metering capabilities at major substations. The project is part of a phased infrastructure upgrade to restore the electrical distribution systems serving the ORNL. The purpose of the upgrade is to maintain a reliable source of electrical power appropriate for servicing scientific research facilities. Without the proposed upgrade, the potential for electrical faults and outages will increase as the distribution system ages, with attendant increased risk of equipment damage and the potential inability to meet laboratory programmatic goals due to downtime of critical facilities. These facilities include the central research facilities, supercomputing facility, Robotics and Process Systems facility, the central chilled water plant, and the steam plant. Also, maintenance costs involved in continued operation of the existing deteriorated system will increase as the system ages.

ES&H Projects:

a. Subproject 02 - Electrical Systems Rehab. Phase IV, (LBNL)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
6,500	0	2,400	4,100	0	0	2Q 1998 - 4Q 2000

The Blackberry Switching Station Replacement Project is the last major planned rehabilitation to the LBNL electrical power system, in order to maintain its reliability and improve its safety. The project will upgrade the existing 12 kV power system and utilize circuit breakers installed in the FY 1987 MEL-FS project improvement to the main Grizzly Substation.

The project will correct existing deficiencies in the power distribution system that serves the Blackberry Canyon Service Area. The improvements will replace the existing electrical system, which consists of aged and underrated electrical equipment, 20 to 30 years old in many instances, that is difficult to maintain and unsafe to operate. It will provide the Laboratory with increased operational flexibility as well as improvements in reliability, maintainability and safety.

b. Subproject 03 - Electrical Systems Upgrade, Phase III, (ANL-E)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
7,620	0	1,459	4,961	1,200	0	2Q 1998 - 1Q 2001

The project provides for the upgrade of the main electrical substation at Facility 543 and Facility 549A.

The work consists of the following items: install a new 138 kV overhead steel pole transmission line and upgrade the existing transmission line, relocate an existing transformer, upgrade existing transformers, replace existing 13.2 kV outdoor switchgear, and replace existing oil circuit breaker.

The intended project will accomplish several objectives related to system reliability, personnel safety, environmental hazards, risk reduction and system expansion.

c. Subproject 07 - Sanitary System Modifications, Phase III, (BNL)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
6,500	0	0	500	3,000	3,000	2Q 1999 - 2Q 2002

The BNL Sanitary System consists of over 20 miles of collection piping which collects sanitary waste from nearly all the BNL facilities. The collection piping transports the waste via gravity piping and lift stations to a sewage treatment plant (STP). This project is the third phase of the upgrade of the Laboratory sanitary waste system. In the first two phases, major operations of the STP were upgraded and approximately 14,000 feet of trunk sewer lines were replaced, repaired, or lined. Phase III will continue this upgrade and will replace or rehabilitate approximately 9,900 feet of existing deteriorated (8 to 20 inch) sewer piping, connect five facilities to the sanitary system by installing 7,500 feet of new sewer pipe, and two new lift stations. This will eliminate non-compliant leaching

fields and cess pools, reduce non-contact cooling water flow into the sewage system by 72 million gallons per year by: diverting flow to the storm system; converting water heat exchangers to air cooled condensers; and replacing water cooled equipment in 15 buildings. The STP anaerobic sludge digester will be replaced with an aerobic sludge digester to eliminate high maintenance activity and improve performance, and install liners and modify the under drain piping in the STP sand filter beds.

d. Subproject 09 - Fire Safety Improvements, Phase IV, (ANL-E)

TEC	Prev.	FY 1998	FY 1999	FY 2000	Outyear	Construction Start/ Completion Dates
8,430	0	0	0	400	8,030	3Q 2000 - 2Q 2003

This project will complete the effort of correcting known deficiencies with respect to fire detection and alarm systems; life safety and OSHA related sprinkler systems; and critical means of egress in twenty-eight (28) buildings at the Argonne National Laboratory-East (ANL-E) site. Correction of these deficiencies is required to comply with DOE Order 420.1, OSHA 1910,164, and OSHA Subpart C. These deficiencies, if uncorrected, could result in unmitigated risks of injury to personnel and/or damage to DOE property in case of fire.

4. Details of Cost Estimate

N/A

5. Method of Performance

Design will be negotiated by architect-engineer contracts or laboratory personnel. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

6. Schedule of Project Funding

N/A

7. Related Annual Funding Requirements

N/A

94-E-363 — Roofing Improvements, Oak Ridge National Laboratory, Oak Ridge, Tennessee

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1994 Budget Request *(Preliminary Estimate)*	1Q 1994	1Q 1995	2Q 1994	1Q 1997	16,000	16,132
FY 1996 Budget Request	1Q 1994	1Q 1995	2Q 1994	2Q 2000	16,000	16,132
FY 1998 Budget Request	1Q 1994	1Q 1995	2Q 1994	2Q 2001	16,000	16,132
FY 2000 Budget Request *(Current Baseline Estimate)*	1Q 1994	1Q 1995	2Q 1994	2Q 2001	16,000	16,132

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design and Construction			
FY 1993	4,024	0[a]	0
FY 1994	3,300	3,136[b]	75
FY 1995	3,000	197[c]	2,463
FY 1996	2,089	2,089	1,431
FY 1997	0	0	918
FY 1998	3,987	3,921[d]	2,324
FY 1999	4,908	4,908	4,200
FY 2000	1,749	1,749	3,820
FY 2001	0	0	769

a This project was proposed as an FY 1993 new start (93-E-329). Application of a portion (-$4,024,000) of the FY 1993 programmatic general reduction of $40,000,000 necessitated a delay in the start of this project to FY 1994.

b Reflects reductions as follows: $-68,000 Contractor Salary Freeze; $-96,000 rescission.

c Reflects application of a portion ($-2,803,000) of Energy Supply Research and Development reductions.

d Reflects application of a portion ($66,000) of Science general reduction.

3. Project Description, Justification and Scope

This project will replace deteriorated roofing on buildings and facilities throughout the Oak Ridge National Laboratory complex. ORNL has over 2.4 million square feet of roof area on approximately 160 buildings. Based on a recent study by the laboratory's Plant and Equipment Division, approximately seventy percent of the total area needs to be replaced due to age and deterioration. This project is the first of several planned projects to replace the deteriorated roofing. It will replace the roofs that are in the worst condition (top priority) on buildings housing the most important facilities. Most of the existing roofing materials contain asbestos and much of it has traces of radioactive contaminants. This project will provide for the installation of new roofing and includes the necessary engineered controls to assure compliance with applicable health and safety regulations.

Approximately 70 percent of the roofs have been in service for over 20 years. Because of age and deterioration, many of these roofs have already developed leaks and require an increasing amount of maintenance. The results of the Plant and Equipment Division study of these roofs, giving the type and condition of each roof by building, including conditions of asbestos and/or radioactive contamination, were used as the basis of the conceptual design. In some cases the problems have reached the point that they could affect equipment, records, and research activities, as well as the health and safety of personnel working in the buildings or facilities.

During the past few years budget constraints and the increased cost of satisfying environment, safety and health regulations have resulted in a reduction in funds available for roof replacement. The effects of this shortfall have been compounded by the increased cost associated with restrictions placed on work with or around asbestos materials. Most of the roofs needing replacement involve asbestos materials. This combination of factors has resulted in a growing backlog of roofs that need replacement due to a lack of adequate funding. The current average annual cost of roof repairs is $800,000. This does not include damage from leaks before repairs are made. There is currently a backlog of over $5,000,000 of repairs needed. The roof replacement program is normally funded from expense funds; however, line item funding is requested because of the magnitude of the backlog and the need to provide an acceptable margin of response to meeting future replacement needs in a timely manner.

Failure to fund this project will result in a continuation of the expensive piece-meal repair program. As the roofs age, the number of leaks will increase, repairs will become more expensive and the potential for serious structural and equipment damage will grow, along with the threat to employee health and safety. Further deterioration of facilities could result in decreased program funding for DOE and ORNL.

Use of the metric system of measurement for design, procurement and construction of this project was considered; but because of the nature of the work and the prevailing practices in the region, it was determined to be uneconomical.

4. Details of Cost Estimate [a]

	(dollars in thousands) Current Estimate	Previous Estimate
Engineering design inspection and administration of construction costs		
Engineering, design and inspection at approximately 7% of construction costs	800	800
Construction management at approximately 12% of construction costs	1,300	1,300
Project management costs at approximately 2% of engineering, design and inspection costs and construction management costs	200	200
Total, Engineering design inspection and administration of construction costs	2,300	2,300
Construction Costs (install new roofing) [b]	2,860	2,860
Removal and packaging of existing roofing	8,040	8,040
Design and project liason, testing, checkout and acceptance	200	200
Total, Construction Costs	13,400	13,400
Contingencies at approximately 19 percent of above costs	2,600	2,600
Total line item cost (TEC)	16,000	16,000

5. Method of Performance

Design shall be performed under a negotiated architect-engineer contract and inspection shall be performed by the operating contractor. To the extent feasible, construction and procurement shall be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

a The cost estimate is based on conceptual design completed April 1991 at a cost of $70,000 and updated March 1993. The DOE Headquarters Economic Escalation Indices for Construction Projects were used as appropriate over the project cycle.

b Construction costs include $60,000 for readiness reviews.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility Cost						
Line Item TEC	4,887	2,324	4,200	3,820	769	16,000
Other Project Costs						
Conceptual design cost	70	0	0	0	0	70
Site characterization	7	0	0	0	0	7
NEPA documentation	5	0	0	0	0	5
Other project-related costs	50	0	0	0	0	50
Total, Other project costs	132	0	0	0	0	132
Total Project Cost (TPC)	5,019	2,324	4,200	3,820	769	16,132

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Facility maintenance and repair costs [a]	515	515
Total related annual funding	515	515
Total operating costs (from FY 2001 through FY 2021)	515	515

[a] Includes dollars to repair roofing installed by this project over the estimated 20 years of life.

Fusion Energy Sciences

Program Mission

The Fusion Energy Sciences program is a broad-based, fundamental research effort, producing valuable scientific knowledge and technological benefits in the near term with the aim of providing the science base for a fusion energy option in the long term.

This is a time of important progress and discovery in fusion research. By virtue of previous investments in facilities, and more recently, sophisticated diagnostics and modeling capabilities, the Fusion Energy Sciences program is making great progress in understanding the fundamental processes of confining fusion fuels, such as the mechanisms responsible for turbulent losses of particles and energy across the magnetic field lines. In addition, the program is identifying and exploring innovative approaches to fusion power in search of an optimized confinement system with an affordable development path.

The high quality of the research in this program is continuously evaluated through the use of merit based peer review and scientific advisory committees.

Program Goal

The goal of the Fusion Energy Sciences program is to:

> *"Acquire the knowledge base for an economically and environmentally attractive fusion energy source."*

Although there is not a schedule for developing and deploying fusion energy systems the availability of fusion, as an option for large central station power plants, would be valuable insurance against possible environmental concerns about fossil and nuclear energy. In addition, there may be nearer term non-electric applications of fusion in transmutation of wastes and isotope production.

Program Objectives

Crosscutting and interrelated objectives of the Fusion Energy Sciences program, as developed through stakeholder meetings and endorsed by the Fusion Energy Sciences Advisory Committee, are summarized below.

- *Understand the physics of plasmas, the fourth state of matter.* Plasmas comprise most of the visible universe, both stellar and interstellar, and have many practical applications. Progress in plasma physics has been the prime engine driving progress in fusion research, and conversely, fusion energy has been the dominant motivation for plasma physics research.
- *Identify and explore innovative and cost-effective development paths to fusion energy.* There are several approaches to fusion, from the tokamak, which is the most advanced power plant candidate, to alternative magnetic configurations, or to inertial confinement using particle beams or lasers. The

current fusion program includes research on tokamak improvements and, increasingly, research on other innovative concepts, including drivers for inertial fusion energy.

- *Explore the science and technology of energy producing plasmas, the next frontier in fusion research, as a partner in an international effort.* Understanding the physics of energy-producing (i.e. burning), plasmas and developing the technologies essential for fusion energy are linked goals that can best be achieved through the cooperative efforts of the world community. The long-term benefits to the United States in such a cooperative effort include enhanced progress toward our mission through scientific and technological integration in the much larger world fusion effort as an energy source for a growing world population.

The Fusion Energy Sciences budget is divided into three subprograms; Science, Facility Operations, and Enabling R&D. The Science subprogram includes research funds for plasma science and the development of improved confinement concepts. Funds for building and operating major experimental facilities are in the Facility Operations subprogram. The Enabling R&D subprogram includes funds for establishing the scientific foundation which underlies current advances in fusion technology and provides technological capabilities and innovations needed to advance plasma science and develop the knowledge base for an attractive fusion energy source.

Scientific Facilities Utilization

The Fusion Energy Sciences request includes $96,600,000 to maintain support of the Department's scientific user facilities. This investment will provide significant research time for thousands of scientists in universities, and other Federal laboratories. It will also leverage both Federally and privately sponsored research, consistent with the Administration's strategy for enhancing the U.S. National science investment. The proposed funding will support operations at the Department's three major fusion energy physics facilities: the Doublet III-D at General Atomics, the Alcator C-Mod at the Massachusetts Institute of Technology and the National Spherical Torus Experiment at Princeton Plasma Physics Laboratory.

Performance Measures

The Fusion Energy Sciences program supports the Department's strategic goal of delivering the scientific and technological innovations critical to meeting the Nation's energy challenges. The performance measures of the Fusion Energy Sciences program fall into four areas: (1) excellence of the science, (2) relevance to the DOE mission and national needs, (3) stewardship of research capabilities, and (4) human resource management. The ways in which the Fusion Energy Sciences program measures performance include components such as peer review, specific charges to the Fusion Energy Sciences Advisory Committee (FESAC), and professional recognition of research performers. These have been an integral part of the program for many years. Each major research facility has a Program Advisory Committee (PAC) that provides broadly based community input directly to the facility team. Proposals for new facilities or upgrades to existing facilities at laboratories have both scientific and cost and schedule reviews.

For FY 2000, specific performance measures are:

- The National Spherical Torus Experiment (NSTX) will operate with a National Research Team demonstrating long pulse (greater than 1 second) operation at plasma currents approaching 1 megampere, a factor of 40 increase over the current exploratory level spherical torus experiments.
- Three new innovative concept exploration experiments--the LSX field-reversed configuration, the flow-stabilized Z pinch (both at the University of Washington) and the Pegasus spherical torus at the University of Wisconsin--will be fully operational providing basic scientific understanding of relevant concept phenomena.
- The DIII-D tokamak will test the feasibility of using increased electron cyclotron heating power and improved power exhaust techniques to extend the pulse length of advanced toroidal operating modes, a necessary requirement for future fusion energy sources.
- A decontamination and decommissioning contract at the Princeton Plasma Physics Laboratory (PPPL) will be awarded for the removal of the Tokamak Fusion Test Reactor (TFTR) tokamak and activated components from the experimental test cell.
- The materials research program will be coordinated with design studies through an overall systems approach, and broadened to allow increased modeling and innovative exploratory research on novel materials" as recommended by the FY 1998 FESAC materials review.
- New funding opportunities in basic plasma science and junior plasma physics faculty development programs will be provided through competitive announcements.
- The theory of strong turbulence will be used as a foundation to develop models for using shear in the plasma flow to stabilize the transport of energy and particles in toroidal devices such as tokamaks and stellarators. In addition, a new energy transport code framework, based on modern computing techniques, will be completed and made available for use via the web.

Significant Accomplishments and Program Shifts

Science

- To accommodate continuing governmental financial constraints, the fusion sciences program continues to move toward more innovation and increased understanding of a wider range of confinement concepts, and away from the more costly, large scale devices aimed at providing integrated plasma and technology experiments operating with power plant-scale plasma parameters.
  - Support of the goal to understand the physics of plasmas continues at the increased level of funding for general plasma science to improve the basis for fusion science and research on high-temperature toroidal plasmas in the DIII-D, C-MOD, and NSTX experiments.
  - Support of the goal to explore innovative and more affordable development paths includes increased operation of the new NSTX science facility. Work on concept improvement at the exploratory level in both physics and enabling R&D will continue to receive strong emphasis.
- A major review of magnetic and inertial fusion energy options by the Secretary of Energy Advisory Board has begun in FY 1999 in response to congressional requests.

- The National Academy Review of the Quality of Science in the Fusion Energy Sciences Program will be carried out in FY 1999 as part of a follow-up to the 1996 restructuring of the fusion program.
- A review of leading candidates for the next proof-of-principle steps within the innovative confinement concepts program was carried out, and program recommendations will be made by FESAC in FY 1999.
- In FY 1999 scientists at the University of Wisconsin will begin testing new stellarator symmetry principles which promise to improve understanding of how to optimize this toroidal fusion concept. At the Lawrence Livermore National Laboratory the first experiments on high temperature sustainment of spheromak plasmas will begin. Both of these elements represent initial results from the FY 1996 restructuring of the fusion program to work more on innovative confinement concepts.
- Within the NSF/DOE Partnership in Basic Plasma Science and Engineering begun in FY 1997, an additional set of applications were reviewed in FY 1998, and 13 were selected for funding including two NSF Career awards. Of the successful applicants, 7 were funded directly by OFES and funding was shared for one of the NSF Career awards. The fusion-sponsored development program for junior faculty in plasma physics in FY 1998 resulted in 2 additional awards. Both programs will continue in FY 1999 and planning with other agencies, including NSF, will be carried out for FY 2000 initiatives.
- A peer-reviewed competition for new ideas in measurement techniques for toroidal and burning plasma devices was carried out in early FY 1999 and awards were announced in February 1999.
- The Electron-Impact Ionization Theory, which was developed at the National Institute of Standards and Technology for fusion applications, is beginning to find application in modeling for air pollution control devices and ionization and radiation monitors. Its application to modeling for plasma processing of semiconducting devices by INTEL and other companies, which was reported last year, continues to grow.
- Current drive using new microwave hardware was shown for high magnetic field operation of the Alcator C-Mod facility. These results, along with demonstrated microwave heating at high magnetic field, indicate that advanced toroidal operating modes can be produced and studied in Alcator C-Mod.

Facility Operations

- The National Spherical Torus Experimental (NSTX) project at the Princeton Plasma Physics Laboratory (PPPL) will be completed in FY 1999 and a national research team will be organized. The facility will begin experimental operations by the 3rd quarter of FY 1999 and the NSTX Program Advisory Committee (PAC) will provide guidance to PPPL for initial operations.
- Significant modifications to the divertor and heating systems of the DIII-D facility were completed, providing capabilities required for FY 2000 experiments that will extend the pulse duration of advanced toroidal operating modes. Important experimental results were obtained that show plasma stability control with feedback coils and demonstration of radio frequency current drive that is necessary for long pulse operations.

Enabling R&D

- Support of the goal to explore the science and technology of energy producing plasmas is dramatically reduced by termination in FY 1999 of U.S. participation in the international pursuit of leading edge science in an integrated, large-scale experimental facility (ITER).
- In early FY 1999, the U.S. will close out its participation in ITER design activities.
- In FY 1999, we will work with other ITER Parties to attempt to complete the testing of the ITER superconducting model coil in Japan. This testing program will confirm the design and establish operating margins and will allow us to benefit from the $45,000,000 we have invested in building a major portion of the coil.
- The fusion program will continue its bilateral and multilateral activities on major scientific facilities abroad and maintain observer contact with the ITER project to keep informed of progress by the remaining three ITER parties.
- The program will retain low activation materials research. However, remaining enabling R&D activities supporting energy-producing plasmas will be drastically reduced.
- A series of critical enabling R&D tasks involving radio-frequency heating and current drive components were successfully completed over the past year. Tasks include fabrication of the NSTX antenna and tuning system, and installation of a DIII-D high power microwave system. The results of these auxiliary heating development efforts will have broad applicability to future U.S. fusion experiments.
- AWARDS

  Marshall Rosenbluth, University of California at San Diego, was awarded the **National Medal of Science** in December 1997

  Darin Ernst, Princeton Plasma Physics Laboratory, won the **1998 APS-DPP Award for Outstanding Doctoral Dissertation in Plasma Physics**

  Nine fusion researchers were elected **Fellows of the American Physical Society in 1998**

  Paul Woskov, MIT Plasma Science and Fusion Center, in collaboration with PNNL, won a **1998 R&D 100 Award** for a device that measures smokestack emissions. The award winning work has its roots in fusion diagnostics and plasma physics.

Funding of Contractor Security Clearances

- In FY 1999, the Department divided the responsibility for obtaining and maintaining security clearances. The Office of Security Affairs, which was responsible for funding all Federal and contractor employee clearances, now pays only for clearances of Federal employees, both at headquarters and the field. Program organizations are now responsible for contractor clearances, using program funds. This change in policy enables program managers to make the decisions as to how many and what level clearances are necessary for effective program execution. In this way, it is hoped that any backlog of essential clearances which are impeding program success can be cleared up by those managers most directly involved. The Office of Science is budgeting $115,000 and $96,000 for estimated contractor security clearances in FY 1999 and FY 2000, respectively, within this decision unit.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Fusion Energy Sciences					
Science	95,116	118,982	-664	118,318	125,434
Facility Operations	56,149	61,195	0	61,195	69,380
Enabling R&D	66,025	43,123	0	43,123	27,800
Program Direction	6,900	0	0	0	0
Subtotal, Fusion Energy Sciences	224,190	223,300	-664	222,636	222,614
General Reduction	0	-664	+664	0	0
Use of Prior Year Balances	-791 [a]	-1,136 [b]	0	-1,136 [b]	0
Total, Fusion Energy Sciences	223,399 [c]	221,500	0	221,500	222,614

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[b] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[c] Excludes $5,157,000 which has been transferred to the SBIR program and $309,000 which has been transferred to the STTR program.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	4,143	4,219	4,419	+200	+4.7%
Sandia National Laboratories	5,850	4,115	3,565	-550	-13.4%
Total, Albuquerque Operations Office	9,993	8,334	7,984	-350	-4.2%
Chicago Operations Office					
Argonne National Laboratory	2,835	2,540	2,135	-405	-15.9%
Brookhaven National Laboratory	50	0	0	0	0.0%
Princeton Plasma Physics Laboratory	49,612	50,332	58,979	+8,647	+17.2%
Total, Chicago Operations Office	52,497	52,872	61,114	+8,242	+15.6%
Idaho Operations Office					
Idaho National Engineering and Environmental Laboratory	4,120	1,740	1,000	-740	-42.5%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	3,947	5,334	5,255	-79	-1.5%
Lawrence Livermore National Laboratory	10,518	11,158	10,168	-990	-8.9%
Stanford Linear Accelerator Center	50	50	50	0	0.0%
Total, Oakland Operations Office	14,515	16,542	15,473	-1,069	-6.5%
Oak Ridge Operations Office					
Oak Ridge Institute for Science and Education	1,229	910	800	-110	-12.1%
Oak Ridge National Laboratory	17,870	17,480	15,866	-1,614	-9.2%
Total, Oak Ridge Operations Office	19,099	18,390	16,666	-1,724	-9.4%
Richland Operations Office					
Pacific Northwest National Laboratory	1,415	1,410	1,430	+20	+1.4%
Savannah River Operations					
Savannah River Tech Center	452	219	0	-219	-100.0%
All Other Sites [a]	122,099	123,129	118,947	-4,182	-3.4%
Subtotal, Fusion Energy Sciences	224,190	222,636	222,614	-22	0.0%
Use of Prior Year Balances	-791 [b]	-1,136 [c]	0	+1,136 [c]	+100.0%
Total, Fusion Energy Sciences	223,399	221,500	222,614	+1,114	+0.5%

[a] Funding provided to laboratories, universities, industry, other federal agencies, and other miscellaneous contractors.

[b] Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

[c] Share of Science general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. Argonne's Fusion Energy Sciences program contributes to a variety of fusion enabling R&D program activities in areas of modeling, analysis, and experimental research. Argonne has a lead role internationally in analytical models and experiments for liquid metal cooling in fusion devices, including the ALEX facility, that studies the interaction of flowing liquid metals with magnetic fields, and liquid lithium flow loop that studies corrosion in candidate structural alloy materials. Argonne's capabilities in the engineering design of fusion energy systems has contributed to the design of ITER components, including blankets, tritium systems, and plasma-facing components, as well as to analysis supporting ARIES studies of fusion power plant concepts. Argonne also contributes to low-activation materials research with its unique capabilities in vanadium alloy testing in fission reactors and post-irradiation examinations.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) is a Multiprogram Laboratory located on 572,000 acres in Idaho Falls, Idaho. Since 1978, INEEL has been the lead laboratory for fusion safety for the Fusion Energy Sciences program. As the lead laboratory, they have helped to develop the fusion safety data base which will demonstrate the environmental and safety characteristics of both nearer term fusion devices and future fusion power plants. They have focused their research on: (1) understanding the behavior of the sources of radioactive and hazardous materials in a fusion machine, (2) understanding the energy sources in a fusion machine that could mobilize these materials, and (3) developing the analytical tools that demonstrate the environmental and safety characteristics of a fusion machine. In FY 2000, fusion efforts at INEEL will be focused solely on safety research associated with existing or planned domestic experimental facilities.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory (LBNL) is a Multiprogram Laboratory located in Berkeley, California. The Laboratory is on a 200 acre site adjacent to the Berkeley campus of the University of California. One of LBNL's missions is to study and apply the physics of heavy ion beams and to advance related technologies. The U.S. Heavy-Ion Fusion (HIF), centered at LBNL, program has the long-range goal of developing inertial fusion energy (IFE) as an economically and environmentally attractive source of electric power.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a Multiprogram Laboratory located on an 821 acre site in Livermore, California. LLNL is host for Defense Programs' National Ignition Facility, which will give the United States the first opportunity in the world to demonstrate inertial fusion ignition and energy gain in the laboratory. This goal will provide the IFE program with crucial results concerning target physics. This fusion energy mission is consistent with the NIF mission statement. Livermore partners with other Laboratories (LBNL, for example, in Heavy Ion Fusion) in fusion energy research. This program also includes collaborations on the DIII-D tokamak at General Atomics, construction of an innovative concept experiment, The Sustained Spheromak Physics Experiment (SSPX) at LLNL, and benchmarking of fusion physics computer models with experiments such as DIII-D. The SSPX will start experimental operations in FY 1999. Definitive results on the feasibility of sustaining high temperature spheromak plasmas utilizing external electrode current drive are expected by the end of FY 2000.

Los Alamos National Laboratory

Los Alamos National Laboratory is a Multiprogram Laboratory located on a 27,000 acre site in Los Alamos, New Mexico. The FY 2000 budget will support the creation of computer codes for modeling the stability of plasmas, as well as work in diagnostics, innovative fusion plasma confinement concepts such as Magnetic Target Fusion, and maintenance of the Tritium Systems Test Assembly (TSTA) facility in a standby mode.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education (ORISE) is located on a 150 acre site in Oak Ridge, Tennessee. ORISE was established by DOE to undertake national and international programs in education, training, health, and the environment. ORISE and its programs are operated by Oak Ridge Associated Universities (ORAU) through a management and operating contract with DOE. Established in 1946, ORAU is a consortium of 88 colleges and universities. For the Office of Fusion Energy Sciences (OFES), ORISE acts as an independent and unbiased agent to administer the Fusion Energy Sciences Graduate and Postgraduate Fellowship Programs, in conjunction with OFES, the Oak Ridge Operations Office (ORO), participating universities, DOE laboratories, and industries. ORISE also assists in the organization and administrative support for the Fusion Energy Sciences Advisory Committee meetings.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. ORNL develops a broad range of components that are critical for improving the research capability of fusion plasma experiments located at other institutions and that are essential for developing fusion as an environmentally acceptable energy source. ORNL will provide leadership of the Virtual Laboratory for Technology, which integrates all U.S. fusion program enabling R&D activities into a coordinated multi-institutional framework. The laboratory is a leader in the theory of heating of plasmas by electromagnetic waves, antenna design, and design and modeling of pellet injectors to fuel the plasma

and control the density of particles. Research is also done in the area of turbulence and its effect on transport of heat through plasma. Codes developed at the laboratory are also used to model plasma processing in industry. While some ORNL scientists are located full-time at off-site locations, others carry out their collaborations with short visits to the host institutions, followed by extensive computer communications from ORNL for data analysis and interpretation, and theoretical studies.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL) is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. The Fusion Energy Sciences program at PNNL is focused on research on materials that can survive in a fusion neutron environment. The available facilities used for this research include mechanical testing and analytical equipment, including state-of-the-art electron microscopes, that are either located in radiation shielded hot cells or have been adapted for use in evaluation of radioactive materials after exposure in fission test reactors. Experienced scientists and engineers at PNNL provide leadership in the evaluation of ceramic matrix composites for fusion applications and support work on vanadium, copper and ferritic steels as part of the U.S. fusion materials team. PNNL also plays a leadership role in a fusion materials collaboration with Japan, with Japanese owned test and analytical equipment located in PNNL facilities and used by both PNNL staff and up to ten Japanese visiting scientists per year.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory (PPPL) is a program-dedicated laboratory (Fusion Energy Sciences) located on 72 acres in Princeton, New Jersey. PPPL is the only U.S. Department of Energy (DOE) laboratory devoted primarily to plasma and fusion science. It hosts experimental facilities used by multi-institutional teams and also sends researchers and specialized equipment to other fusion facilities in the United States and abroad. PPPL is the host for the National Spherical Torus Experiment (NSTX), which is an innovative toroidal confinement device closely related to the tokamak, and is currently working on the conceptual design of another innovative toroidal concept, the compact stellarator. PPPL scientists and engineers have significant involvement in the DIII-D and Alcator C-Mod tokamaks in the U.S. and the large JET (Europe) and JT-60U (Japan) tokamaks abroad. This work is focused on developing the scientific understanding and innovations required for an attractive fusion energy source. PPPL scientists are also involved in several basic plasma science experiments, ranging from magnetic reconnection to plasma processing. PPPL, through its association with Princeton University, provides high quality education in fusion-related sciences, having produced 175 Ph.D. graduates since its founding in 1951.

Sandia National Laboratory

Sandia National Laboratory is a Multiprogram Laboratory, with a total of 3,700 acres, located in Albuquerque, New Mexico, with other sites in Livermore, California, and Tonapah, Nevada. Sandia's Fusion Energy Sciences program plays a lead role in developing plasma-facing components for fusion devices through the study of plasma interactions with materials, the behavior of materials exposed to high

heat fluxes, and the interfaces of plasmas and fusion device first wall. Sandia selects, specifies, and develops materials for components exposed to high heat and particles fluxes and conducts extensive analysis of prototypes to qualify components before their in use in fusion devices. Materials samples and prototypes are tested in Sandia's Plasma Materials Test Facility, which use high-power electron beams to stimulate high heat fluxes expected in fusion environments. Materials and components are exposed to tritium-containing plasmas in the Tritium Plasma Experiment. Tested materials are characterized using Sandia's accelerator facilities for ion beam analysis. Sandia supports a wide variety of domestic and international fusion experiments in areas of tritium inventory removal, materials postmortem analysis, diagnostics development, and component design and testing.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center (SLAC) is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. SLAC is operated for the United States Department of Energy by Stanford University. The main interest in fusion at SLAC is the possibility of adapting the accelerator science and technology from elementary particle physics to the production of fusion power from the implosion of inertial fusion targets driven by beams of high energy, heavy ions. A member of the accelerator research department at SLAC has been involved with the heavy ion fusion program since its inception.

All Other Sites

The Fusion Energy Sciences program funds research at 51 colleges/universities located in 25 states. This line also includes funding for DIII-D and related programs at General Atomics and funding of research awaiting distribution pending completion of review results or program office detailed planning.

Science

Mission Supporting Goals and Objectives

The goals of this subprogram are to advance our understanding of plasma science, and to develop innovative approaches for confining a fusion plasma. These goals are accomplished through a modest program in basic plasma science; active research programs in both toroidal innovations and in non-toroidal concepts; focused efforts to resolve outstanding physics issues related to energy producing plasmas; strong theory and modeling programs; and the creation of improved diagnostics that make possible rigorous testing of the scientific principles of fusion.

Plasma science is the study of ionized matter—ranging from neon lights to stars—that make up 99 percent of the visible universe. It contributes not only to fusion research, but also to many national science and technology goals, ranging from astrophysics to industrial processing to national security. One objective of the Science subprogram is to broaden the intellectual and institutional base in fundamental plasma physics. Ongoing programs including a development program for junior faculty in plasma physics and a joint NSF/DOE partnership in plasma physics and engineering contribute to this objective.

Fusion energy research advances through a balanced combination of large-, medium-, and small-scale experiments, theory, and modeling. The largest component of the Science subprogram is the tokamak research activity, which focuses on gaining a predictive understanding of the behavior of plasmas in near reactor-level conditions where the fusion fuel begins to "burn". Tokamak research will be carried out primarily on the DIII-D facility at General Atomics. DIII-D has been a major contributor to the world fusion program over the past decade by developing advanced modes of toroidal operations through the flexibility of its plasma shaping and computer control systems, and by increasing the knowledge base of fusion physics through extensive diagnostics and theoretical and modeling support of experiments. The other major U.S. tokamak experiment, the Alcator C-Mod at the Massachusetts Institute of Technology (MIT), uses high magnetic fields to explore high temperature and density plasmas in a unique, compact, and cost-effective facility. Additional high-leverage tokamak research will be carried out through international collaborations on large, state-of-the-art facilities abroad. Increased collaboration on facilities such as JET (Europe) and JT-60 (Japan) was recommended by the Fusion Energy Science Advisory Committee.

Research on alternative confinement concepts, both magnetic and inertial, is aimed at identifying approaches that may improve the economical and environmental attractiveness of fusion energy sources. This research is carried out at various levels ranging from the concept explorations stage to the proof-of-principle stage. The first proof-of-principle experiment, the new National Spherical Torus Experiment (NSTX) facility at the Princeton Plasma Physics Laboratory (PPPL), will begin its first full year of operation in FY 2000, with a goal of demonstrating improved stability and confinement in a very compact structure over the next several years. Additional proof-of-principle level experiments at PPPL, University of Wisconsin, and Los Alamos National Laboratory have been positively reviewed and are awaiting further consideration by the Fusion Energy Sciences Advisory Committee. Small-scale exploratory experiments are carried out primarily at universities, while proof-of-principle experiments, such as the NSTX will be primarily hosted at national laboratories.

The Inertial Fusion Energy (IFE) activity is exploring an alternate path for fusion energy that would capitalize on the major R&D effort in inertial confinement fusion (ICF) carried out for stockpile stewardship purposes within the Office of Defense Programs. The IFE program depends on the ICF program for experimental research into the physics of target ignition that will be tested in the National Ignition Facility at LLNL. Efforts in IFE focus on developing the components needed to apply the ICF results to energy systems. These include the most efficient methods for heating and compressing a target pellet to fusion conditions, methods for clearing the target chamber between pulses, and target design.

Theory and modeling are essential to progress in fusion and plasma science because they provide the capability to analyze existing experiments, produce new ideas to improve performance, and provide a scientific assessment of new ideas. An important component of the theory program is the development and use of computational tools to help understand the physical phenomena that govern confinement of high temperature plasmas. Similarly, the development and improvement of diagnostic tools for analyzing plasma behavior continues to provide new insights regarding fusion plasmas.

Performance Measures

- Three new innovative concept exploration experiments--the LSX field-reversed configuration, the flow-stabilized Z pinch (both at the University of Washington) and the Pegasus spherical torus at the University of Wisconsin--will be fully operational providing basic scientific understanding of relevant concept phenomena.
- A new energy transport code framework, based on modern computing techniques, will be completed and made available for use via the web.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Tokamak Experimental Research	46,198	46,831	45,918	-913	-1.9%
Alternative Concept Experimental Research	23,996	38,600	45,150	+6,550	+17.0%
Theory	19,773	22,500	23,000	+500	+2.2%
General Plasma Science	5,149	6,109	6,500	+391	+6.4%
SBIR/STTR	0	4,278	4,866	+588	+13.7%
Total, Science	95,116	118,318	125,434	+7,116	+6.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Tokamak Experimental Research			
■ TFTR physics research was completed in 1998.	5,500	0	0
■ DIII-D at General Atomics (GA) is the major operating tokamak in the United States. DIII-D is a national facility, with about half of its scientific staff coming from U.S. fusion laboratories other than GA, as well as some from several foreign laboratories. In FY 2000 the research activity will focus on use of two new hardware improvements in auxiliary heating and power exhaust systems. This will allow progress in the development of advanced toroidal operations for long pulses which is essential for incorporation of these operating modes into the design of future machines.	21,430	21,905	22,520
■ Alcator C-Mod will also operate as a national facility with an improved set of diagnostics. Research activity will focus on support of the compact, high field approach to ignition and on the physics of the plasma edge and power exhaust.....	6,211	7,600	7,800
■ Several unique, innovative tokamak experiments are supported at leading universities. These focus on various topics, including advanced toroidal operating modes and plasma stability and control. This program also develops unique diagnostic probes that provide an understanding of the plasma behavior in fusion research devices, supplying the necessary information for analysis codes and theoretical interpretation. The requested funding level in FY 2000 supports the core diagnostic development research, as well as the work begun as a result of an FY 1999 competitive initiative to develop new diagnostic techniques.	6,557	7,400	7,250

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ International collaboration at the level of $4,200,000 provides the opportunity for joint and coordinated experiments between the U.S. and foreign experiments, thereby increasing the database and the understanding of fusion physics. With the limited operation of major tokamaks in the U.S., international collaboration provides increased opportunity for the U.S. scientists to continue their participation in the advancement of fusion science, especially in the area of burning plasma physics. The scientists from PPPL and ORNL will continue collaborations with JET, Tore Supra, TEXTOR, and ASDEX-UG in Europe and with JT-60U in Japan. The remaining $4,148,000 is required for graduate and postgraduate fellowships in fusion science and technology, general science literacy programs with teachers and students, support for historically black colleges and universities, and similar broad outreach efforts related to fusion science and technology.	6,500	9,926	8,348
Total, Tokamak Experimental Research	46,198	46,831	45,918

Alternative Concept Experimental Research

■ **Experimental Plasma Research (Alternates):** Research on novel magnetic confinement configurations is important both for its intrinsic scientific value and for its potential to discover concepts that would make more attractive fusion power sources. This category has two components. The first component contains twelve diversified exploratory level experiments located primarily in universities. Four of these experiments (Sustained Spheromak Physics Experiment at LLNL; Columbia University/MIT Dipole; Ion Rings at Cornell University; and Ion Trap at LANL) resulted from a FY 1998 innovative concept competition. A second category includes design and experimental work on three novel concepts that have been proposed for full proof-of-principle funding..	14,550	19,000	23,750

■ **NSTX:** The NSTX at PPPL will begin the first full year of research in FY 2000. The research program will be organized as a national collaboration with representatives of other institutions participating in the research activity on an equal basis with researchers from PPPL. Initial objectives will be plasma formation, two methods of controlled startup, plasma heating by radio-frequency waves and diagnostic surveys to define acceptable operational regimes that can be used

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
for more powerful experiments. Advanced diagnostic development specifically for NSTX is also funded by this element.	2,446	9,800	11,300
■ **Inertial Fusion Energy:** Inertial fusion energy research continues with efforts to improve heavy ion accelerator efficiency, chamber wall protection, and design of fusion energy target pellets. Scoping studies for major next step device options will be undertaken, with a goal of providing the inertial fusion energy program the capacity to benefit from physics results on Defense Programs' National Ignition Facility in the latter part of the next decade.	7,000	9,800	10,100
Total, Alternative Concept Experimental Research	23,996	38,600	45,150

Theory

- The theory and modeling program is a broad-based program with researchers located at national laboratories, universities, and industry. A new program emphasis is advanced computing, including the development of new modeling codes and a code library for use by all fusion researchers. Work in tokamak theory ($15,105,000) includes efforts to support existing toroidal experiments and also includes the development of many new theories and modeling tools, since these are usually applied to tokamaks before being applied to alternates. An example of this is work on self organized criticality, which may provide a new approach to understanding confinement. The majority of the work in toroidal theory is aimed at developing a complete physical picture of advanced toroidal operating modes. With the restructuring of the fusion program, there is an increased focus on alternate concepts. In alternate concept theory ($2,707,000), the emphasis will be on understanding the fundamental processes determining equilibrium, stability, and confinement in each alternate. Generic theory ($2,188,000) covers development of basic plasma theory that is applicable not only to fusion research, but also to basic plasma science. It also includes work on atomic theory, which is applicable to all confinement devices.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The objective of the advanced computing activity is to improve simulation and modeling capabilities in order to obtain a quantitative understanding of plasma behavior in fusion experiments. This will ensure optimum use of a set of innovative national experiments and fruitful collaboration on major international facilities. In FY 2000, funds ($3,000,000) will be used to develop a modern transport code to simulate energy transport in toroidal magnetic confinement systems. . .	19,773	22,500	23,000
General Plasma Science			
■ The plasma science program focuses on basic plasma science and engineering research, primarily in the university community. Advances in basic plasma physics will support the Fusion Energy Sciences program as well as other important areas of science and technology. Both the Plasma Science Junior Faculty Development Program and collaborative efforts such as the NSF/DOE plasma science and engineering program will continue at FY 1999 levels. The program will also continue to collect and distribute atomic physics data for fusion.	5,149	6,109	6,500
SBIR/STTR			
■ In FY 1998 $3,476,000 and $208,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	0	4,278	4,866
Total, Science	95,116	118,318	125,434

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Tokamak Experimental Research	
■ Additional funding is provided for increased diagnostics on DIII-D.	+615
■ Additional funding is provided for increased research expenses on Alcator C-Mod.	+200

	FY 2000 vs. FY 1999 ($000)
■ This decrease is primarily associated with the FY 1999 prior year general reduction account going to zero in FY 2000.	-1,578
■ Reduction will decrease support for research at UCLA	-150
Total, Tokamak Experimental Research	-913
Alternative Concept Experimental Research	
■ Support for NSTX research is increased to provide funding for personnel and minor equipment for the first full year of operations that includes research collaborations and preparations of advanced diagnostics.	+1,500
■ Funding for alternate concept experiments is increased to maintain breadth and permit establishment of one or more proof-of-principle experiments..	+4,750
■ This increase will permit continued efforts to improve accelerator efficiency for inertial fusion energy..	+300
Total, Alternative Concept Experimental Research	+6,550
Theory	
■ The advanced computational effort will expand efforts to develop new codes to predict plasma performance.	+500
General Plasma Science	
■ These funds will enhance the NSF/DOE Partnership in Basic Plasma Science and Engineering.	+391
SBIR/STTR	
■ Support for SBIR/STTR is mandated at 2.65 percent. These grants will support plasma science, fusion science, and fusion enabling R&D.	+588
Total Funding Change, Science	+7,116

Facility Operations

Mission Supporting Goals and Objectives

This activity provides for the operation of major experimental facilities that are the essential tools that enable scientists in university, industry, and laboratory based research groups to perform experimental research in fusion research facilities: DIII-D at GA, Alcator C-Mod at MIT, and NSTX at PPPL. These facilities consist of magnetic plasma confinement devices, plasma heating and current drive systems, diagnostics and instrumentation, experimental areas, computing and computer networking facilities, and other auxiliary systems. It includes the cost of operating personnel, electric power, expendable supplies, replacement parts and subsystems, and inventories. In the case of PPPL, this funding also supports beginning the final three-year phase of decontamination and decommissioning of the Tokamak Fusion Test Reactor which was shut down in FY 1997; ongoing caretaking for the tritium systems and activated elements is required during this process. General plant projects (GPP) funding for PPPL supports minor facility renovations, other capital alterations and additions, and buildings and utility systems. Capital equipment funding for upgrading the research capability of DIII-D is also included, as are funds for design, modification, and installation of the NSTX neutral beam heating system, and for further enhancements to the facility.

The principal objective of the Facility Operations subprogram is to maximize the quantity and quality of data collected for experiments being conducted at fusion energy science facilities.

The following table summarizes the scheduled weeks of operations for DIII-D and NSTX.

Facility Utilization

	(Weeks of Operation)		
	FY 1998	FY 1999	FY 2000
DIII-D	15	14	14
Alcator C-Mod	9	12	18
TFTR	8	0[a]	0[a]
NSTX	0	6	14

[a] Facility Shutdown.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
TFTR	5,140	3,600	13,600	+10,000	+277.8%
DIII-D	26,370	29,195	29,880	+685	+2.3%
Alcator C-Mod	9,689	9,923	10,100	+177	+1.8%
NSTX	13,850	16,800	15,000	-1,800	-10.7%
General Plant Projects /Other	1,100	1,677	800	-877	-52.3%
Total, Facility Operations	56,149	61,195	69,380	+8,185	+13.4%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
TFTR			
■ Begin a three-year program ($10,000,000 in FY 2000 out of a planned total of $48,000,000) to complete the decontamination and decommissioning of TFTR. This activity will provide for the removal and disposal of the tokamak and remaining activated components from the test cell and the basement. In addition during the D&D funding ($3,600,000) is necessary to maintain and keep the facility safe during the project.	5,140	3,600	13,600
DIII-D			
■ Provides support for operation, maintenance, and improvement of the DIII-D Electron Cyclotron Heating (ECH) systems and support for other equipment at the GA site. In FY 2000, these funds support plasma operation using hydrogen and deuterium fuel for approximately 14 weeks; plus downtime for significant upgrades to the ECH, divertor systems, and maintenance.	26,370	29,195	29,880
Alcator C-Mod			
■ Provides support for operation, maintenance and minor machine improvements. In FY 2000, these funds support plasma operation using hydrogen and deuterium fuel for approximately 18 weeks; plus down time for machine and diagnostic improvements.	9,689	9,923	10,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
NSTX			
■ Provides for continuation of research activity on the NSTX experiment and installation of the first set of planned diagnostic upgrades. This will allow extension of the pulse duration to 1 second and operation at plasma currents approaching 1 megampere, a factor of 40 increases over current exploratory level spherical torus experiments; first investigations of non-inductive current drive, a principal program objective; and measurement of advanced plasma confinement scenarios.	1,770	7,900	12,500
■ **NSTX Project:** Project completed in FY 1999 and facility begins operations.	12,080	5,450	0
■ **NSTX Neutral Beam:** Project for preparation and installation of a previous TFTR neutral beam heating system on NSTX.	0	3,450	2,500
Total, NSTX	13,850	16,800	15,000
General Plant Projects/Other			
■ These funds provide primarily for general infrastructure repairs and upgrades. The major project included in the FY 2000 plan is an upgrade of the fire alarm system throughout the site where NSTX is located.	1,100	1,677	800
Total, Facility Operations	56,149	61,195	69,380

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
TFTR	
■ Funding is provided to initiate TFTR decontamination and decommissioning.	+10,000
DIII-D	
■ Additional funding is for operation of increased number of DIII-D systems (ECH, divertor, etc.).	+685
Alcator C-Mod	
■ Additional funding is provided for increased operation of the Alcator C-Mod.	+177
NSTX	
■ A decrease for the NSTX project at PPPL is due to the completion of fabrication, and a shift to facility operations.	-5,450
■ An increase in NSTX facility operations to support the first full year of operations.	+4,600
■ A decrease in NSTX neutral beam heating system to complete this fabrication effort.	-950
Total, NSTX	-1,800
General Plant Projects/Other	
■ General Plant Projects support at PPPL is increased $100,000 to reflect maintenance requirements; support for other facility operations is terminated.	-877
Total Funding Change, Facility Operations	+8,185

Enabling R&D

Mission Supporting Goals and Objectives

For sustained scientific progress toward ultimate research goals, science-oriented programs that push the frontiers of human knowledge, such as fusion, require intellectual resources, experimental facilities with state-of-the-art technological capabilities, and technology innovations. The Enabling R&D subprogram includes funds for: (1) establishing the scientific foundation that underlies current technological advances in fusion, and (2) providing the technological capabilities and innovations needed to advance fusion science; developing the knowledge base for an attractive fusion energy source. These contribute to two strategic goals for the fusion program. This subprogram is divided into two elements: Engineering Research and Materials Research.

For the Engineering Research element, activities through FY 1998 were heavily oriented toward the ITER Engineering Design Activities (EDA), a four party (European Union, Japan, Russian, U.S.) international effort to demonstrate the scientific and technological feasibility of fusion as an energy source. In July 1998 the other three ITER parties prepared to enter into a 3-year post-EDA extension period that would develop a reduced cost design and provide the basis for an assessment of the technical, financial, and hosting readiness to proceed with ITER construction as an international project. However the DOE was unable to obtain congressional agreement for U.S. participation in the extension. Accordingly, the U.S. effort toward ITER will be closed out in early FY 1999, and the Engineering Research element restructured by being downsized and redirected away from energy-oriented goals.

In restructuring this element in FY 1999, the scope of activities will be broadened to address more fully the diversity of domestic interests in enabling R&D. These interests include a focus on critical needs for enabling technologies for U.S. plasma experiments and for international collaborations that allow the U.S. to access plasma experimental conditions not available domestically. These interests also include the scientific foundations of innovative technology concepts for future plasma experiments. These innovations are needed to exploit the performance gains being sought from physics concept improvement research. Major FY 1998 accomplishments include: completion, as an ITER participant, of the ITER Final Design Report, which is the first comprehensive, fully integrated design of a major fusion power experiment; completion of winding the ITER superconducting magnet model coil, which will be shipped to Japan in early FY 1999 for testing in a Japanese facility during FY 1999; and completion of critical tasks involving radio-frequency heating and plasma current drive components that have broad applicability to the U.S. fusion program.

The Materials Research element continues to focus its scientific research on low-activation materials which have high performance capability and can withstand long-term exposure to the energetic particles and electromagnetic radiation expected from energy-producing plasmas. During FY 1998, this element made major inroads toward mapping of irradiation effects on candidate low-activation alloys, which is needed to set priorities for future research, and underwent a review by FESAC that will continue to influence planning for FY 1999 and beyond.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Engineering Research	58,281	34,991	20,074	-14,917	-42.6%
Materials Research	7,744	7,000	7,000	0	0.0%
SBIR/STTR	0	1,132	726	-406	-35.9%
Total, Enabling R&D	66,025	43,123	27,800	-15,323	-35.5%

Detailed Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Engineering Research			
■ Funding reductions will require a substantial downsizing and redirection of effort on the energy-oriented technology segment of the fusion program. Efforts will be focused on critical needs of domestic plasma experiments and on the scientific foundations of innovative technology concepts for future plasma experiments. Nearer-term experiment support efforts will be oriented toward plasma facing components ($5,600,000) and plasma heating and fueling technologies ($3,700,000). Longer-term efforts will be oriented toward: superconducting magnet research ($1,500,000) and plasma facing and energy extraction component innovations ($1,500,000) needed to fully exploit investments in concept improvement experiments; and toward tritium research ($1,000,000) and safety research ($1,000,000) issues critical to the safety and environmental attractiveness of fusion as an energy source. Advanced design studies will be directed toward identifying attractive pathways toward fusion energy ($2,950,000). In addition, design studies of next-step options ($2,224,000), taking fullest advantage of recent scientific advances, will continue. Management of this diverse collection of fusion technologies will be accomplished through a Virtual Laboratory for Technology ($600,000) whereby improved coordination and communication of plans, progress, and results will be accomplished through the use of modern information technology.	58,281	34,991	20,074

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Materials Research			
■ Materials research remains a key element in developing a safe, reliable, and environmentally attractive fusion energy system. Scientific understanding and the development research and testing of vanadium alloys, silicon carbide composite materials, and advanced ferritic steels for structural service in the high power zones for fusion energy sources will continue. Priorities for this work, including innovative approaches to evaluating materials and improved modeling of materials behavior are guided by the results of a Fusion Energy Sciences Advisory Committee review conducted during 1998.	7,744	7,000	7,000
SBIR/STTR			
■ In FY 1998 $1,681,000 and $101,000 were transferred to the SBIR and STTR programs, respectively. The FY 1999 and FY 2000 amounts are the estimated requirement for the continuation of the SBIR and STTR programs.	0	1,132	726
Total, Enabling R&D	66,025	43,123	27,800

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Engineering Research	
■ Reduction in research on superconducting magnets plasma facing components and plasma fueling (following completion of ITER Superconducting Model Coil)..	-7,322
■ Reduction in research on energy extraction, diagnostics, tritium processing, vacuum vessel welding, remote handling, and safety.	-2,731
■ Reduction in design of next step option experiments being considered within U.S. domestic fusion program.	-1,276
■ Increase in Advanced Design Studies	+500
■ Reduction in information technology research	-948
■ Reduction in ITER closeout costs to zero in FY 2000	-3,140
Total, Engineering Research	-14,917

	FY 2000 vs. FY 1999 ($000)
SBIR/STTR	
■ Reduction due to overall reduction in Engineering Research.	-406
Total Funding Change, Enabling R&D	-15,323

Program Direction

Mission Supporting Goals and Objectives

This subprogram was transferred to the Science Program Direction decision unit in FY 1999 at the direction of Congress. This subprogram provided the Federal staffing resources and associated funding needed to plan, direct, manage, and administer the highly complex scientific and technical research and development program in fusion energy.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Salaries and Benefits	910	0	0	0	0.0%
Travel	74	0	0	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	190	0	0	0	0.0%
Total, Chicago Operations Office	1,174	0	0	0	0.0%
Full Time Equivalents	11	0	0	0	0.0%
Oakland Operations Office					
Salaries and Benefits	184	0	0	0	0.0%
Travel	14	0	0	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	2	0	0	0	0.0%
Total, Oakland Operations Office	200	0	0	0	0.0%
Full Time Equivalents	2	0	0	0	0.0%
Headquarters					
Salaries and Benefits	4,001	0	0	0	0.0%
Travel	225	0	0	0	0.0%
Support Services	600	0	0	0	0.0%
Other Related Expenses	700	0	0	0	0.0%
Total, Headquarters	5,526	0	0	0	0.0%
Full Time Equivalents	39	0	0	0	0.0%

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Total Fusion Energy Sciences					
Salaries and Benefits	5,095	0	0	0	0.0%
Travel	313	0	0	0	0.0%
Support Services	600	0	0	0	0.0%
Other Related Expenses	892	0	0	0	0.0%
Total, Program Direction	6,900	0	0	0	0.0%
Full Time Equivalents	52	0	0	0	0.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
■ Funded staff managing and supporting the Fusion Energy Sciences program.	5,095	0	0
Travel			
■ Provided on-site contractor and facility oversite and participated in major scientific conferences to maintain state-of-the-art scientific and technical expertise.	313	0	0
Support Services			
■ Provided the level of support services needed to provide for the program's mailroom; security; travel services; information technology, infrastructure; and environment, safety and health support..	600	0	0
Other Related Expenses			
■ Provided funds to cover the minimum level of funds to cover hardware/software acquisitions, infrastructure technology upgrades, training, special emphasis programs and the Working Capital Fund..	892	0	0
Total, Program Direction	6,900	0	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ This subprogram was transferred to the Science Program Direction decision unit in FY 1999 at the direction of Congress.	N/A

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Feasibility of Design Considerations	0	0	0	0	0.0%
Economic and Environmental Analysis	0	0	0	0	0.0%
Test and Evaluation Studies	0	0	0	0	0.0%
Total, Technical Support Services	0	0	0	0	0.0%
Management Support Services					
Management Studies	0	0	0	0	0.0%
Training and Education	5	0	0	0	0.0%
ADP Support	245	0	0	0	0.0%
Administrative Support Services	350	0	0	0	0.0%
Total, Management Support Services	600	0	0	0	0.0%
Total, Support Services	600	0	0	0	0.0%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	0	0	0	0	0.0%
Working Capital Fund	500	0	0	0	0.0%
Printing and Reproduction	0	0	0	0	0.0%
Rental Space	26	0	0	0	0.0%
Software Procurement/Maintenance Activities/Capital Acquisitions	366	0	0	0	0.0%
Total, Other Related Expenses	892	0	0	0	0.0%

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	1,100	700	800	+100	+14.3%
Capital Equipment	15,295	16,645	10,810	-5,835	-35.1%
Total, Capital Operating Expenses	16,395	17,345	11,610	-5,735	-33.1%

Major Items of Equipment *(TEC $2 million or greater)*

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Acceptance Date
DIII-D Upgrade	32,400	18,225	1,550	5,440	5,440	FY 2002
NSTX	21,100	3,570	12,080	5,450	0	FY 1999
NSTX - Neutral Beam	5,950	0	0	3,450	2,500	FY 2000
Total, Major Items of Equipment		21,795	13,630	14,340	7,940	

Science Program Direction

Program Mission

This program provides the Federal staffing and associated funding required to provide overall direction of activities carried out under the following programs in the Office of Science (SC): High Energy Physics, Nuclear Physics, Biological and Environmental Research, Basic Energy Sciences, Fusion Energy Sciences, Computational and Technology Research, Multiprogram Energy Laboratories-Facilities Support, and Energy Research Analyses. This funding also provides the necessary support to the Director of SC to carry out SC's responsibilities under the Department of Energy (DOE) Organization Act (P.L. 95-91) and as mandated by the Secretary. These responsibilities include providing advice on the status and priorities of the Department's overall research and development programs and on the management of the Department's multipurpose laboratories; developing research and development plans and strategies; and supporting university and science education. This program also provides program-specific staffing resources at the Chicago, Oakland, and Oak Ridge Operations Offices directly involved in executing SC programs.

Program direction has been divided into four categories: salaries and benefits, travel, support services, and other related expenses, the latter including the Working Capital Fund. "Support Services" refers to support services contracts that provide necessary support functions to the Federal staff, such as technical support, computer systems development, travel processing, and mailroom activities. "Other related expenses" refers to other administrative costs of maintaining Federal staff, such as building and facility costs and utilities in the field, information technology expenses, and training. The Working Capital Fund includes centrally provided goods and services at Headquarters, such as supplies, rent and utilities.

Also included in Program Direction are several specific education related activities. For over 50 years, the Department of Energy and its predecessor agencies (Atomic Energy Commission and the Energy Research and Development Administration) has supported science and engineering education programs involving university faculty as well as pre-college teachers and students. The Department has provided support for university students, pre-college teachers and college faculty through hands-on research experiences at the Department's National Laboratories and research facilities.

The involvement of the Energy Department's National Laboratories in faculty/student research is perhaps the most distinguishing feature of the agency's participation over the years in science and engineering education. No other Federal agency has the extensive network of research laboratories and facilities as DOE with its unique physical and human resources. These laboratories and facilities have been key to the Department's contribution over time to the Nation's science and engineering education goals.

The funds appropriated for science education will support activities that utilize the Department's scientific and technical resources to enhance the development of a diverse, well-educated and scientifically literate workforce.

In addition to the science education program in this science program direction budget, other mission oriented education activities are funded within science research programs. Below is a table identifying the programs and the allocation of funds. The funds will allow university faculty and student teams at the

undergraduate level to participate on long-term research projects at DOE laboratories. Pre-college science and math teachers will be provided with research appointments to improve their knowledge and skills of scientific discovery and enhance their ability to apply them in a classroom environment. Through these investments, the Department will make major contributions towards fulfilling several national priorities: enhancing the diversity of the technical workforce; supporting systemic reform of undergraduate education; and attracting, retaining, and graduating students in fields of interest to DOE and others in the public and private sectors. The funds will also allow the Department to encourage educators to participate directly in the ongoing science research of its laboratories. By joining teams of researchers, educators will experience directly the cutting-edge development of the Science Laboratories, and will better understand the process of scientific investigation. Funds provided will pay for faculty/student and pre-college teachers' stipends, travel, and housing and will subsidize laboratory scientists' time for this activity.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Basic Energy Sciences	0	0	1,947
Computational Technology Research	0	0	1,947
Biological and Environmental Research	0	0	1,947
High Energy Physics	0	0	2,921
Nuclear Physics	0	0	973
Total	0	0	9,735

Program Goal

To fund the staff and related expenses that are necessary to provide overall management direction of SC's basic and fundamental scientific research programs funded in the Science appropriation; and to enable the Director of SC to serve as the Department's science advisor for formulation and implementation of basic and fundamental research policy.

For science education the goal is to ensure that the Department effectively utilizes and leverages the resources of its laboratory-based system to support its energy, science and math education mission.

Program Objectives

- To develop, direct and administer a complex and broadly diversified program of mission-oriented basic and applied research and development designed to support the development of new and improved energy, environmental and health technologies.
- To manage the design, construction and operation of forefront scientific research facilities for use by the Nation's scientific community, including the Spallation Neutron Source Project.
- To conduct independent technical assessments, peer reviews and evaluations of research proposals, programs and projects.

- To enhance international collaboration to leverage the U.S. investment in research and development.
- To review, analyze and, where appropriate, champion the recommendations of the Office of Science's Federally chartered advisory committees including the Fusion Energy Sciences Advisory Committee, High Energy Physics Advisory Panel, Nuclear Science Advisory Committee, Basic Energy Sciences Advisory Committee, and Biological and Environmental Research Advisory Committee.
- To provide opportunities and effective mechanisms for students and faculty to participate at the Department's laboratories in hands-on research experiences, with a focus on undergraduates.
- To enhance departmental outreach activities in science, technology, engineering and mathematics education at our R&D facilities in order to increase the awareness and understanding of the general public of the Department's science programs.

Performance Measures

- Responsiveness to national science policy and major science initiatives.
- Improvement in environment, safety and health compliance.
- Provision for new and enhanced research facilities and equipment within scope and budget and on schedule.
- Continued improvement in the utilization of staffing, travel and support contractor funds.
- Continuance of improved levels of facility operating time.
- Expansion of international collaborative efforts.
- Cost sharing and leveraging of program resources with other agencies on a one-to-one basis to multiply the program's impact.
- Increase the flow of underrepresented students up to 50 percent into science and math programs/careers achieved.

Significant Accomplishments and Program Shifts

Program Direction

- The Office of Science continues to achieve technical excellence in its programs despite managing one of the largest, most diversified and most complex basic research portfolios in the Federal Government with a relatively small Federal and support contractor staff compared to other programs both within and outside the Department.
- Increased productivity at U.S. scientific research facilities as part of the Scientific Facilities Utilization initiative.

- Concluded the international agreement for U.S. participation in the Large Hadron Collider project. Signatories included the Secretary of Energy and the Director of the National Science Foundation. Execution of the program has begun.
- Initiated operation of the William R. Wiley Environmental Molecular Sciences Laboratory at Pacific Northwest National Laboratory.
- At Fermilab, complete construction of the C-Zero Experimental Hall within scope and budget, and on schedule (FY 1999 completion); and complete the Main Injector within scope and budget, and on schedule (FY 1999 initial operation).
- Complete the B-factory and its detector at the Stanford Linear Accelerator Center within scope and budget, and on schedule (FY 1999 initial operation).
- Continue construction of the Relativistic Heavy Ion Collider and its detectors at Brookhaven National Laboratory within scope and budget, and on schedule (FY 2000 initial operation).
- Enhance the scientific capabilities for experiments at the Thomas Jefferson National Accelerator Facility (TJNAF) to provide new opportunities for researchers. Three TJNAF experimental halls will be fully operational.
- Carrying out experiments at the Radioactive Ion Beam facility at Oak Ridge National Laboratory.
- Continue pilots in FY 1999 for transfer of management responsibility from Environmental Management to Science for newly generated wastes at the Stanford Linear Accelerator Center (SLAC) and Fermilab.
- Manage the Joint Genome Institute and the Atmospheric Radiation Measurement sites using the National Laboratories as an integrated system.
- Strengthen integrated safety management and infrastructure management at the National Laboratories.
- Operate the state-of-the-art National Energy Research Scientific Computing and Energy Science Network for the benefit of SC and DOE.
- Plan and manage a complex, scientific R&D program to establish the knowledge base needed for an attractive fusion energy science.
- Continue and refine framework of appropriate international arrangements needed to carry out SC programs in a most cost-effective manner.
- Continue to improve environmental, safety and health performance at the Brookhaven National Laboratory through aggressive implementation of the DOE Action Plan for Improved Management of the Laboratory.
- Continue enhancement of neutron science capability at the Los Alamos Neutron Science Center and the High Flux Isotope Reactor at Oak Ridge.
- Continue design and construction of the Neutrinos at the Main Injector (NuMI) project.

- Establishment of the Spallation Neutron Source Project Office at the Oak Ridge Operations Office in FY 2000.
- Implement the Scientific Simulation Initiative to rapidly develop and deploy a national terascale computing infrastructure and apply it to complex civilian science and engineering problems of national importance.

Science Education

- The Science Undergraduate Laboratory Fellowship Program has implemented an innovative, interactive Internet system to receive and process hundreds of student applications for summer and semester research appointments at 11 participating DOE Laboratories. The automated system is virtually paperless and provides an excellent example of how the Internet can be used to streamline the operation of the Department's research participation programs.
- Through special recruitment efforts, the Science Undergraduate Laboratory Research Fellowship Program has attracted a diverse group of students using the electronic application. Nearly 20 percent of those submitting applications represented under represented ethnic groups. About 40 percent of the applications were female, and more than 25 percent were from low-income families. More than 400 summer 1998 appointments were made through the new application process with additional appointments expected in the fall.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Science Program Direction					
Program Direction	37,600	45,300	0	45,300	47,860
Science Education	0	4,500	0	4,500	4,500
Total, Science Program Direction	37,600 [a]	49,800	0	49,800	52,360
Staffing (FTEs)					
Headquarters (FTEs)	220	269	0	269	274
Field (FTEs)	34	49	0	49	51
Total, FTEs	254 [a]	318	0	318	325

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

[a] In FY 1998 $6,900,000 was appropriated for 52 FTEs in the Energy Supply Research and Development Fusion Energy Sciences program now funded in Science Program Direction.

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Ames Laboratory	0	250	250	0	0.0%
Argonne National Laboratory	0	525	525	0	0.0%
Brookhaven National Laboratory	0	525	525	0	0.0%
Fermi Nat'l Accel. Laboratory	0	225	225	0	0.0%
Princeton Plasma Physics Laboratory	0	275	275	0	0.0%
Total, Chicago Operations Office	0	1,800	1,800	0	0.0%
Golden Field Office					
Nat'l Renewable Energy Laboratory	0	225	225	0	0.0%
Oakland Operations Office					
Lawrence Berkeley Nat'l Laboratory	0	475	475	0	0.0%
Stanford Linear Accel. Center	0	225	225	0	0.0%
Total, Oakland Operations Office	0	700	700	0	0.0%
Oak Ridge Operations Office					
Oak Ridge Inst. For Science & Education	0	400	400	0	0.0%
Oak Ridge Nat'l Laboratory	0	475	475	0	0.0%
Thomas Jeff. Nat'l Accel. Facility	0	225	225	0	0.0%
Total, Oak Ridge Operations Office	0	1,100	1,100	0	0.0%
Richland Operations Office					
Pacific Northwest Nat'l Laboratory	0	475	475	0	0.0%
All Other Sites	37,600	45,500	48,060	+2,560	+5.6%
Total	37,600	49,800	52,360	+2,560	+5.1%

Site Description

Ames Laboratory

Ames Laboratory is a Multiprogram Laboratory located on 10 acres in Ames, Iowa. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Argonne National Laboratory

Argonne National Laboratory (ANL) in Argonne, Illinois, is a Multiprogram Laboratory located on a 1,700 acre site in suburban Chicago. ANL has a satellite site located in Idaho Falls, Idaho. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Brookhaven National Laboratory

Brookhaven National Laboratory is a Multiprogram Laboratory located on a 5,200 acre site in Upton, New York. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Fermi National Accelerator Laboratory

Fermi National Accelerator Laboratory is a program-dedicated laboratory (High Energy Physics) located on a 6,000 acre site in Batavia, Illinois. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory is a Multiprogram Laboratory located in Berkeley, California. The Laboratory is on a 200 acre site adjacent to the Berkeley campus of the University of California. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate

on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

National Renewable Energy Laboratory

National Renewable Energy Laboratory is a program-dedicated laboratory (Solar) located on 300 acres in Golden, Colorado. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Oak Ridge National Laboratory

Oak Ridge National Laboratory is a Multiprogram Laboratory located on a 24,000 acre site in Oak Ridge, Tennessee. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Oak Ridge Institute for Science and Education

Oak Ridge Institute for Science and Education is located on a 150 acre site in Oak Ridge, Tennessee. Educational activities are in support of the national laboratory participation program which provides hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is a Multiprogram Laboratory located on 640 acres at the Department's Hanford site in Richland, Washington. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate

their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory is a program-dedicated laboratory (Fusion Energy Sciences) located on 72 acres in Princeton, New Jersey. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Stanford Linear Accelerator Center

Stanford Linear Accelerator Center is a program-dedicated laboratory (High Energy Physics) located on 426 acres in Menlo Park, California. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Thomas Jefferson National Accelerator Facility

Thomas Jefferson National Accelerator Facility is a program-dedicated laboratory (Nuclear Physics) located on 273 acres in Newport News, Virginia. Educational activities supported at the laboratory are directed towards providing hands-on research experiences for undergraduate student and science teacher participants on state-of-the-art equipment while engaging them on important issues at the forefront of scientific inquiry. Teachers, utilizing the Department's extensive computational and communications technology expertise, will also concentrate on developing tools and materials to translate their research experiences into computerized learning tools that can be used to take advantage of the universal availability of the Internet as a teaching medium.

Program Direction

Mission Supporting Goals and Objectives

Program Direction provides the Federal staffing resources and associated costs required to provide overall direction and execution of Office of Science program and advisory responsibilities. Science Program Direction supports staff in the High Energy Physics, Nuclear Physics, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, Computational and Technology Research, Multiprogram Energy Laboratories-Facilities Support, and Energy Research Analyses programs, including management and technical support staff. This program also supports staff at the Chicago, Oakland, and Oak Ridge Operations Offices directly involved in program execution. The staff includes scientific and technical personnel as well as program support personnel in the areas of budget and finance, general administration, grants and contracts, information resource management, policy review and coordination, infrastructure management, construction management, and environment, safety and health.

The FY 2000 request includes Working Capital Fund resources of $3,285,000 to cover the costs of centrally provided goods and services at Headquarters, such as supplies, rent, and utilities.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Salaries and Benefits	1,949	3,054	3,345	+291	+9.5%
Travel	93	187	190	+3	+1.6%
Support Services	5	198	160	-38	-19.2%
Other Related Expenses	84	124	166	+42	+33.9%
Total, Chicago Operations Office	2,131	3,563	3,861	+298	+8.4%
Full-Time Equivalents	20	32	32	0	0.0%
Oakland Operations Office					
Salaries and Benefits	695	867	889	+22	+2.5%
Travel	20	51	51	0	0.0%
Support Services	0	0	0	0	0.0%
Other Related Expenses	35	39	39	0	0.0%
Total, Oakland Operations Office	750	957	979	+22	+2.3%
Full-Time Equivalents	6	10	10	0	0.0%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Operations Office					
Salaries and Benefits	633	634	833	+199	+31.4%
Travel	35	40	70	+30	+75.0%
Support Services	0	0	52	+52	+100.0%
Other Related Expenses	32	68	117	+49	+72.1%
Total, Oak Ridge Operations Office	700	742	1,072	+330	+44.5%
Full-Time Equivalents	8	7	9	+2	+28.6%
Headquarters					
Salaries and Benefits	23,343	28,409	30,180	+1,771	+6.2%
Travel	1,015	1,240	1,420	+180	+14.5%
Support Services	4,690	5,146	5,120	-26	-0.5%
Other Related Expenses	4,971	5,243	5,228	-15	-0.3%
Total, Headquarters	34,019	40,038	41,948	+1,910	+4.8%
Full-Time Equivalents	220	269	274	+5	+1.9%
Total Science					
Salaries and Benefits	26,620	32,964	35,247	+2,283	+6.9%
Travel	1,163	1,518	1,731	+213	+14.0%
Support Services	4,695	5,344	5,332	-12	-0.2%
Other Related Expenses	5,122	5,474	5,550	+76	+1.4%
Total, Science Program Direction	37,600	45,300	47,860	+2,560	+5.7%
Full-Time Equivalents	254	318	325	+7	+2.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Staff funded in this decision unit monitor and evaluate over 3,500 grants and contracts at more than 225 institutions, including universities, industry and other government agencies, in addition to monitoring and evaluating the programs at 13 National and single-purpose Laboratories. SC also manages the Department-wide Small Business Innovation Research and Small Business Technology Transfer programs. Our reengineering efforts have eliminated unnecessary and non-value added work from the system where possible. In FY 2000, SC will also support the Spallation Neutron Source Project Office in Oak Ridge and the Scientific Simulation Initiative.	26,620	32,964	35,247
Travel			
The FY 2000 estimate reflects escalation of costs for airfare, lodging, etc. This increase only reflects a two percent increase over FY 1999. Alternatives to travel such as teleconferencing will be utilized when possible.	1,163	1,518	1,731
Support Services			
Provide necessary mailroom, travel services, environment, health and safety support, computer systems development, SBIR program support, security and hardware and software installation, configuration, and maintenance activities. Emphasis in FY 1999 and FY 2000 will be placed on continued implementation of an information architecture for Science to establish integrated business management systems, consistent with the provisions of the Clinger-Cohen Act (Information Technology Management Reform Act) of 1996. This is essential to take work out of the system and to meet workload demands. SC is widely acknowledged as being the most efficient and conservative user of support services contracts in the Department.	4,695	5,344	5,332

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Acquire computer hardware and software in FY 1999 and FY 2000 necessary to accomplish corporate systems development and networking upgrades. The FY 1999 and FY 2000 estimates include $3,243,000 and $3,285,000, respectively, to cover Headquarters Working Capital Fund charges.	5,122	5,474	5,550
Total, Program Direction	37,600	45,300	47,860

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Increase of $2,283,000 in salaries and benefits is due to two additional FTE's for the Spallation Neutron Source Project Office in Oak Ridge, five additional FTEs for the Scientific Simulation Initiative, and the impact of cost of living, locality pay, within grades, promotions, lump sum payments, and awards.	+2,283
Travel	
■ Increase of $213,000 in travel provides a partial offset for escalation of travel costs, airfare, lodging, and miscellaneous expenses due to inflation	+213
Support Services	
■ Decrease of $12,000 in support services provides the minimum level of support services needed to provide for SC's needs.	-12
Other Related Expenses	
■ Increase of $76,000 in Other Related Expenses provides the minimum amount of funds to cover hardware/software acquisitions, infrastructure technology upgrades, field training, and the Working Capital Fund.	+76
Total Funding Change, Science Program Direction	+2,560

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Economic and Environmental Analysis	1,488	1,488	1,325	-163	-11.0%
Test and Evaluation Studies	0	160	100	-60	-37.5%
Total, Technical Support Services	1,488	1,648	1,425	-223	-13.5%
Management Support Services					
Management Studies	207	207	110	-97	-46.9%
Training and Education	58	63	40	-23	-36.5%
ADP Support	2,282	2,376	2,847	+471	19.8%
Administrative Support Services	660	1,050	910	-140	-13.3%
Total, Management Support Services	3,207	3,696	3,907	+211	5.7%
Total, Support Services	4,695	5,344	5,332	-12	-0.2%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	60	71	76	+5	7.0%
Working Capital Fund	2,679	3,243	3,285	+42	1.3%
Printing and Reproduction	0	33	11	-22	-66.7%
Rental Space	0	26	0	-26	-100.0%
Software Procurement/Maintenance Activities/Capital Acquisitions	2,383	2,101	2,172	+71	3.4%
Other	0	0	6	+6	+100.0%
Total, Other Related Expenses	5,122	5,474	5,550	+76	1.4%

Science Education

Mission Supporting Goals and Objectives

For over 50 years, the Department of Energy and its predecessor agencies (the Atomic Energy Commission and the Energy Research and Development Administration) has supported science and engineering education programs involving university faculty as well as pre-college teachers and students. The Department has provided support for university students, pre-college teachers and college faculty through hands-on research experiences at the Department's National Laboratories and research facilities.

The involvement of the Energy Department's national laboratories in faculty/student research is perhaps the most distinguishing feature of the agency's participation over the years in science and engineering education. No other Federal agency has the extensive network of research laboratories and facilities as DOE with its unique physical and human resources. These laboratories and facilities have been the key to the Department's contribution over time to the Nation's science and engineering education goals.

As we approach the new century, the Nation continues to face important challenges related to the recruitment and retention into science and engineering of students who have historically been under represented (e.g., women, disabled persons, African Americans, Hispanic Americans and Native Americans) in these fields. Guided by recent reports such as the National Research Council on Undergraduate Education Achievement Trends in Science and Engineering, the Department will continue to design, through the Office of Science, an undergraduate research fellowship program that couples academic study with extensive hands-on research experiences in a variety of DOE national laboratory settings. This program is intended to enhance the likelihood that underrepresented students will successfully complete their undergraduate studies and move on to graduate school. Historically, over two-thirds of undergraduates who have participated in DOE programs such as this have gone on to graduate school in disciplines directly relevant to the DOE science and technology missions.

In addition to the science education program in this science program direction budget, $9,734,000 of other mission oriented education activities are funded within science research programs. Below is a table identifying these programs and the allocation of funds. The funds will allow university faculty and student teams at the undergraduate level to participate on long-term research projects at DOE laboratories. Pre-college science and math teachers will be provided with research appointments to improve their knowledge and skills of scientific discovery and enhance their ability to apply them in a classroom environment. Through these investments, the Department will make major contributions towards fulfilling several national priorities: enhancing the diversity of the technical workforce; supporting systemic reform of undergraduate education; and attracting, retaining, and graduating students in fields of interest to DOE and others in the public and private sectors. The funds will also allow the Department to encourage educators to participate directly in the ongoing science research of its laboratories. By joining teams of researchers, educators will experience directly the cutting-edge development of the Science Laboratories, and will better understand the process of scientific investigation. Funds provided will pay for

faculty/student and pre-college teachers' stipends, travel, and housing and will subsidize laboratory scientists' time for this activity.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Basic Energy Sciences	0	0	1,947
Computational Technology Research	0	0	1,947
Biological and Environmental Research	0	0	1,947
High Energy Physics	0	0	2,921
Nuclear Physics	0	0	973
Total	0	0	9,735

Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Undergraduate SC Laboratory Fellowship Program	0	3,900	3,900	0	0.0%
National Science Bowl Program	0	400	400	0	0.0%
Albert Einstein Distinguished Educator Fellowship Program	0	200	200	0	0.0%
Total, Science Education	0	4,500	4,500	0	0.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Undergraduate SC Laboratory Fellowship Program			
The Science Undergraduate Laboratory Research Fellowship Program is a key component of the SC Science Education Program to enable students to focus their research interests on solving current scientific problems and prepare for meeting the challenge of DOE's future energy science mission requirements. The program will also ensure a steady flow of students with technical expertise into the Nation's pipeline of workers in both academia and industry.	0	3,900	3,900

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
National Science Bowl Program			
In addition, the Office of Science will manage and support the "National Science Bowl" for high school students from across the country. Since its inception, more than 50,000 high school students have participated in this event. The National Science Bowl is a highly publicized academic competition among teams of high school students who answer questions on scientific topics in astronomy, biology, chemistry, mathematics, physics, earth, computer, and general science. In 1991, DOE developed the National Science Bowl to encourage high school students from across the nation to excel in math and science and to pursue careers in those fields. It provides the students and teachers who have prepared them a forum to receive national recognition for their talent and hard work. We are planning to invest $400,000 into the National Science Bowl to manage both regional and national competitions.	0	400	400
Albert Einstein Distinguished Educator Fellowship Program			
The Albert Einstein Fellowship Awards for High School Teachers continues to be a strong pillar of the program for bringing real classroom experiences to our education programs and outreach activities. This congressional initiative, established by the Albert Einstein Distinguished Educator Fellowship Act of 1994, has enabled the Department to maintain an enriching relationship with the National Triangle Coalition that serves the Federal Government as the clearinghouse for selecting the teachers. We plan to invest $200,000 in the Einstein Fellowship Awards which will allow us to place teachers at the Department and in the U.S. Congress.	0	200	200
Total, Science Education	0	4,500	4,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ No funding changes from FY 1999 to FY 2000 for Science Education.	0
Total Funding Change, Science Education	0

Nuclear Waste Disposal

Nuclear Waste Disposal
Proposed Appropriation Language

For nuclear waste disposal activities to carry out the purposes of Public Law 97-425, as amended, including the acquisition of real property or facility construction or expansion, [$169,000,000] *$258,000,000* to remain available until expended, [of which $165,000,000 is] to be derived from the Nuclear Waste Fund; and *in addition $39,000,000 shall be derived by transfer from funds appropriated to the Defense Nuclear Waste Disposal account in Public Law 104-46 to become available without regard to the limitations of Public Law 104-46 and to remain available until expended; Provided, That* [of which] not to exceed [$250,000] *$4,727,000* may be provided to the [Department of Energy to reimburse the] State of Nevada [solely for expenditures, other than salaries and expenses of State employees,] to conduct scientific oversight responsibilities pursuant to the Nuclear Waste Policy Act of 1982, [and] *(Public Law 97-425) as amended: Provided further, That* not to exceed [$5,540,000] $5,432,000 may be provided to affected *units of* local governments, as defined in Public Law 97-425, to conduct appropriate activities pursuant to the Act: *Provided further*, That the distribution of the funds [to] *as determined by* the units of local government shall be [determined] *approved* by the Department of Energy: *Provided further*, That the funds shall be made available to the *State and* units of local government by direct payment: *Provided further*, That within 90 days of the completion of each Federal fiscal year, the *State and* each local entity shall provide certification to the Department of Energy, that all funds expended from such payments have been expended for activities as defined in Public Law 97-425. Failure to provide such certification shall cause such entity to be prohibited from any further funding provided for similar activities: *Provided further*, That none of the funds herein appropriated may be: (1) used directly or indirectly to influence legislative action on any matter pending before Congress or a State legislature or for lobbying activity as provided in 18 U.S.C. 1913; (2) used for litigation expenses; or (3) used to support multi-state efforts or other coalition building activities inconsistent with the restrictions contained in this Act.

Explanation of Change

The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000. This funding will be used to carry out required scientific and technical studies identified in the Viability Assessment of the proposed repository at the Yucca Mountain Site. The FY 2000 Request is identical to the funding profile depicted in the Viability Assessment. Without the identified level of funding, the Program would have to be recast to attempt to hold the critical milestone for a decision whether to recommend the Site to the President in 2001.

The prohibition regarding the use of Nuclear Waste Disposal funds for salaries and expenses of State employees is proposed for elimination in the FY 2000 appropriations request. In earlier versions of the President's budget, this clause was inadvertently not proposed for deletion.

Office of Civilian Radioactive Waste Management
Executive Budget Summary

Program Mission

The Office of Civilian Radioactive Waste Management is responsible for the management and disposal of the Nation's spent nuclear fuel and high-level radioactive waste. The office provides leadership in developing and implementing strategies to accomplish this mission that assure public and worker health and safety, protect the environment, merit public confidence, and are economically viable.

Program Goal

The Nuclear Waste Policy Act of 1982 established the Federal government's responsibility and statutory framework to provide for the permanent disposal of commercially generated spent nuclear fuel and the high-level radioactive waste generated by the Nation's nuclear defense activities. As originally enacted, the Act also directed the Department to study the need for and feasibility of the development and operation of a monitored retrievable storage for spent nuclear fuel. The Department submitted a site-specific proposal for such a facility, but the siting action was nullified by Congress in the Nuclear Waste Policy Amendments Act of 1987.

The Department, as directed by the Act, initially undertook a national screening exercise to evaluate candidate repository sites. In 1986, at the conclusion of this scientific screening activity, the Department recommended three sites to the President for further study as potential geologic repositories. Congress, however, in the Nuclear Waste Policy Amendments Act of 1987, directed the Department to investigate only one site, Yucca Mountain, Nevada, for possible development as a geologic repository.

Disposition in a geologic repository provides a final, permanent solution for the commercially generated spent nuclear fuel that is currently in temporary storage at reactor sites around the country. A geologic repository is also key to the disposition of the high-level radioactive wastes that resulted from operation of the Department's facilities that were key elements of the Nation's nuclear weapons complex (e.g., Hanford, Idaho National Laboratory, Rocky Flats, Savannah River). Continued progress by the Civilian Radioactive Waste Management Program is critical to the completion of the clean-up of those sites now under the jurisdiction of the Department's Office of Environmental Management. A permanent repository site will also enable the Nation to continue to demonstrate leadership and advance nonproliferation goals by moving forward with its plans for the disposition of weapons-grade materials (Highly Enriched Uranium and Plutonium). Additionally, a permanent geologic repository site will enable the Department to dispose of spent fuel used in the Naval Nuclear Propulsion Program.

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Significant Accomplishments and Program Shifts

The Conference Report to the FY 1997 Energy and Water Appropriations Act directed the Program to complete a Viability Assessment for the Yucca Mountain site. This report was completed and submitted to Congress in December 1998.

The Viability Assessment is the compilation of almost 16 years of intensive, scientific and technical work at the Yucca Mountain site. It is an unparalleled synthesis of information and data regarding the Yucca Mountain site's ability to contain spent nuclear fuel and high-level radioactive waste. The Viability Assessment describes the Yucca Mountain site, the repository and waste package's design and costs, and details the results of a quantitative Total System Performance Assessment that describes how the site's engineered and natural barriers work together as a system. The Viability Assessment also contains a plan for and costs associated with the submission of a License Application to the Nuclear Regulatory Commission and the costs to construct and operate a repository at the Yucca Mountain site.

The FY 2000 Budget Request is identical to the funding requirements in the Viability Assessment. Without the identified level of funding, the Program would have to be recast to attempt to hold the critical milestone for Site Recommendation to the President in 2001. In addition, the scheduled submission of the License Application to the Nuclear Regulatory Commission in 2002 would slip. This slippage would also affect the 2010 date for emplacement of spent fuel and initiation of operations of the repository.

The Viability Assessment now provides the foundation for the Program's current and planned set of activities.

Program Objectives

The Program continues to aggressively build on the momentum achieved in the last four years. In FY 1999, the Program is planning to complete the Draft Environmental Impact Statement for Yucca Mountain and, in FY 2000, issue the Final Environmental Impact Statement. The completion of these major Program objectives will be followed by: 1) a decision by the Secretary whether to recommend the Yucca Mountain site to the President in 2001, if the site is found to be suitable; and 2) if recommended, submission of a License Application for the construction of a repository to the Nuclear Regulatory Commission in 2002

We are continuing the transition begun in FY 1999; that is, to shift emphasis from the construction/operations arena and the collection of basic data to activities that support the remaining key near-term objectives articulated in the Nuclear Waste Policy Act - the preparation of materials to support a Site Recommendation to the President and the submission of a License Application to the Nuclear Regulatory Commission. Those activities were described, in large part, in the *License Application Plan and Costs* (Volume 4) of the Viability Assessment. The work generally includes further refinement of repository and waste package designs, continued evaluation of repository behavior through total system performance assessment, refinement of the conceptual and numerical models used in evaluating repository performance, and continued scientific investigations to reduce

key uncertainty about the Yucca Mountain site. In addition, the Program will focus on assisting the Russian Federation in developing geologic repository alternatives to current radioactive waste management practices and use of Russian scientists and engineers for furthering nonproliferation objectives.

Key FY 2000 Activities

The Office of Civilian Radioactive Waste Management's FY 2000 budget request of $409 million supports the activities necessary to determine the suitability of the Yucca Mountain site as a repository, develop the documentation needed for a Secretarial decision on the Site Recommendation to the President in FY 2001, and conduct other activities associated with the Federal government's waste acceptance obligations.

Following the issuance of the Viability Assessment and the Draft Environmental Impact Statement for the Yucca Mountain site in FY 1999, the Program, through its Yucca Mountain Site Characterization Office, will focus principally on completing the Final Environmental Impact Statement and on technical and scientific investigation activities and repository and waste package design activities. These activities will serve to support a decision whether to recommend the Site to the President in 2001 and prepare a License Application for submission to the Nuclear Regulatory Commission in 2002. Activities proposed to be undertaken at the Yucca Mountain site are fully consistent with the description of the remaining work contained in the Viability Assessment.

Submission of the License Application in 2002 will complete the Site Characterization Phase of the repository program. Scientific and technical work will, however, continue subsequent to the submission of the License Application for performance confirmation purposes.

The Office of Waste Acceptance, Storage and Transportation will continue to focus on development of implementation plans for achieving the legal and physical transfer of spent nuclear fuel from reactor sites and Department-operated sites (e.g. Hanford, Idaho National Laboratory, Rocky Flats, Savannah River) once a Federal radioactive waste management facility becomes available. The Department will also continue to develop acquisition plans for waste acceptance and transportation services utilizing private sector entities. This approach offers a market stimulus for commercial development of the equipment and management capabilities required for transportation and storage of the spent nuclear fuel and high-level waste.

Program Organization

The Program continues to utilize two business centers (Yucca Mountain Site Characterization Project and the Waste Acceptance, Storage and Transportation Office) and a management center. The management center's responsibilities focus on providing overarching regulatory compliance, program control and management functions to both business centers.

Sources of Funding

To provide funding for the Program's activities, our FY 2000 appropriations request is principally from two sources: the Nuclear Waste Disposal Appropriation and the Defense Nuclear Waste Disposal Appropriation. The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000.

Major Issues

Prior Year Reductions in Funding

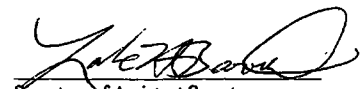
As a result of a comprehensive reassessment of the Program undertaken in 1994, a new program approach was prepared. This program approach was described in detail in the *Civilian Radioactive Waste Management Program Plan* (December 1994). To support the Program's activities, a funding profile was also developed. However, beginning in FY 1996, the Program received substantially less funding than was required to implement the program approach. As a consequence, the approach outlined in the Program Plan was no longer sustainable. The Program revised its approach to preserve the most critical activities and milestones. That approach was described in the *draft Civilian Radioactive Waste Management Program Plan, Revision 1 (May 1996).* Furthermore, despite streamlining its approach to meeting the objectives of the Nuclear Waste Policy Act and achieving considerable efficiencies and undertaking additional, unplanned work, such as the cross-drift, the Program has received less funding than the funding profile contained in the 1996 Program Plan. A new funding profile was developed and was included in the Civilian Radioactive Waste Management Program Plan, Revision 2, dated July 1998. This had the effect of increasing programmatic, scientific and technical risk.

The recently issued Viability Assessment contains a revised funding profile that supports the critical programmatic milestones. We have developed and costed a scope of work that is required to meet the established milestones. The Program now finds itself at the point of not being able to absorb any additional funding reductions without having impacts on the critical near-term milestones for the Yucca Mountain Site Characterization Project. Obviously, any near-term milestone slippage would also affect the planned 2010 date for emplacement of waste at that site.

Performance Measures

FY 2000 efforts will focus on development of the technical bases and draft documents that will support a Site Recommendation Statement in FY 2001. The following product-oriented performance measures are planned for FY 2000 in support of the Site Recommendation Statement and License

Application: complete and issue the final Environmental Impact Statement; select the reference design for a decision whether to recommend the Site and the License Application; and, select the natural system reference models for Site Recommendation and License Application.



Signature of Assistant Secretary

1/21/99

Date

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustment	FY 1999 Current Appropriation	FY 2000 Request	
Nuclear Waste Fund/Defense Nuclear Waste						
Yucca Mountain Site Characterization	267,710	282,414	0	282,414	331,667	a
Waste Acceptance, Storage & Transportation	5,947	1,850	0	1,850	5,730	
Accelerator Transmutation of Waste	0	4,000	0	4,000	0	
Program Management Center	72,343	69,736	0	69,736	71,603	
Subtotal, Nuclear Waste/Defense Waste	346,000	358,000	0	358,000	409,000	a b
Less Transfer from Previous Appropriation	0	0	0	0	-39,000	a b
Use of prior year balances	-304	0	0	0	0	
Total, Civilian Radioactive Waste Management	345,696	358,000	0	358,000	370,000	a
Funding Sources						
Nuclear Waste Disposal						
Nuclear Waste Fund	156,000	165,000	0	165,000	258,000	a b
General Fund	0	4,000	0	4,000	0	
Plus Transfer from Previous Appropriation	0	0	0	0	39,000	a b
Total, Nuclear Waste Disposal	156,000	169,000	0	169,000	297,000	a b
Gross Defense Nuclear Waste Disposal						
Defense Nuclear Waste Disposal	190,000	189,000	0	189,000	112,000	a b
Less Transfer from Previous Appropriation	0	0	0	0	-39,000	a b
Net, Defense Nuclear Waste Disposal	190,000	189,000	0	189,000	73,000	a b
Total, Program Funding	346,000	358,000	0	358,000	370,000	a

Public Law Authorization:
P L 97-425, "Nuclear Waste Policy Act" (1982)
P.L 100-203, "Nuclear Waste Policy Amendments Act" (1987)

[a] The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000

[b] Of the $370 million in new budget authority requested, $112 million is requested for the Defense Nuclear Waste Disposal account in FY 2000. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer of unobligated balances to the Nuclear Waste Disposal account will be scored as a reduction in current budget authority in the Defense Nuclear Waste Disposal account , resulting in net budget authority of $73 million.

In addition, $258 million in new budget authority is requested from the Nuclear Waste Disposal Fund for the Nuclear Waste Disposal account. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer will be scored as an increase in current budget authority in the Nuclear Waste Disposal account, resulting in net budget authority of $297 million

Five-Year Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request	FY 2001 Request [a]	FY 2002 Request [a]
Yucca Mountain Site Characterization					
Core Science	73,669	74,832	73,959	52,300	50,771
Design and Engineering	62,888	78,394	91,539	91,903	102,122
Licensing/Suitabilty & Perf Assessment	31,143	53,130	61,192	51,237	43,225
NEPA	4,254	1,962	2,343	2,200	1,155
Operations/Construction	47,814	34,203	42,705	29,200	29,304
Project Management	36,042	28,234	37,600	32,358	21,304
External Oversight, PETT & Closeout	11,900	11,659	22,329	20,500	20,030
Total, Yucca Mountain Site Characterization	267,710	282,414	331,667 [b]	279,698	267,911
Waste Acceptance, Storage and Transportation					
Spent Fuel Storage	1,549	310	0	0	0
Transportation	3,180	10	4,100	19,311	31,111
Waste Acceptance	523	916	1,030	1,579	1,939
MPC Subsystem	0	0	0	0	0
Project Integration	695	614	600	1,340	1,500
Total, Waste Acceptance, Storage & Transportation	5,947	1,850	5,730	22,230	34,550
Accelerator Transmutation of Waste	0	4,000	0	0	0
Program Integration					
Quality Assurance	0	0	0	0	0
Program Management	5,049	6,009	6,260	6,260	6,390
Human Resources & Administration	4,814	5,241	5,532	5,532	5,402
Subtotal, Program Integration	9,863	11,250	11,792	11,792	11,792
Program Direction	62,480	58,486	59,811	56,280	55,747
Total, Program Integration	72,343	69,736	71,603	68,072	67,539
Total, Program	346,000	358,000	409,000 [b c]	370,000 [a]	370,000 [a]
Funding Sources:					
Nuclear Waste Disposal					
Nuclear Waste Fund	156,000	165,000	258,000 [b c]	180,000	180,000
General Fund	0	4,000	0	0	0
Plus Transfer from Previous Appropriation	0	0	39,000 [b c]	0	0
Total, Nuclear Waste Disposal	156,000	169,000	297,000 [b c]	180,000 [a]	180,000 [a]
Gross Defense Nuclear Waste Disposal					
Defense Nuclear Waste Disposal	190,000	189,000	112,000 [b c]	190,000	190,000
Less Transfer from Previous Appropriation	0	0	-39,000 [b c]	0	0
Net, Defense Nuclear Waste Disposal	190,000	189,000	73,000 [b c]	190,000 [a]	190,000 [a]
Total, Program Funding	346,000	358,000	370,000 [b]	370,000 [a]	370,000 [a]

[a] The outyears shown here are preliminary, and do not necessarily reflect program requirements. Future budget requests for the program have yet to be established and will be determined through the annual executive and Congressional budget process.

[b] The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000

Five-Year Funding Profile (continued)

[c] Of the $370 million in new budget authority requested, $112 million is requested for the Defense Nuclear Waste Disposal account in FY 2000. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer of unobligated balances to the Nuclear Waste Disposal account will be scored as a reduction in current budget authority in the Defense Nuclear Waste Disposal account , resulting in net budget authority of $73 million.

In addition, $258 million in new budget authority is requested from the Nuclear Waste Disposal Fund for the Nuclear Waste Disposal account. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer will be scored as an increase in current budget authority in the Nuclear Waste Disposal account, resulting in net budget authority of $297 million

Projected Receipts and Funding[a]

(dollars in millions)

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
One mill/kWh Fee[b]	600	642	632	632	631	632	632
One-time Fee	0	0	0	0	0	0	0
Subtotal	600	642	632	632	631	632	632
Investment	743 [c]	692 [d]	839 [d]	917 [d]	1,008 [d]	1,080 [d]	1,129 [d]
Total Income	1,343	1,334	1,471	1,549	1,639	1,712	1,761
Funding Sources:							
Nuclear Waste Disposal							
Nuclear Waste Fund	156	165	258 [e,f]	180	180	180	180
General Fund	0	4	0	0	0	0	0
Plus Transfer from Previous Approp.	0	0	39 [e,f]	0	0	0	0
Total, Nuclear Waste Disposal	156	169	297 [e,f]	180 [g]	180 [g]	180 [g]	180 [g]
Defense Nuclear Waste Disposal							
Defense Nuclear Waste Disposal	190	189	112 [e,f]	190	190	190	190
Less Transfer from Previous Approp.	0	0	-39 [e,f]	0	0	0	0
Total, Defense Nuclear Waste Disposal	190	189	73 [e,f]	190 [g]	190 [g]	190 [g]	190 [g]
Total, Program Funding	346	358	370 [e]	370 [g]	370 [g]	370 [g]	370 [g]

[a] Income and funding projections are subject to change based on the resolution of the 1998 waste acceptance obligation between DOE and contract holders

[b] As forecast by EIA in Dec 1998

[c] The values represent "earnings available for appropriation", which consist of coupon payments received; net discounts and premiums on bills, notes, and bonds. Discounts on zero-coupon bonds have been amortized using the market value approach. Under the straight line basis, the value is $569 million.

[d] The values represent "earnings available for appropriation", which consist of coupon payments received; net discounts and premiums on bills, notes, and bonds. Discounts on zero-coupon bonds have been amortized on a straight line basis.

[e] The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000

[f] Of the $370 million in new budget authority requested, $112 million is requested for the Defense Nuclear Waste Disposal account in FY 2000. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer of unobligated balances to the Nuclear Waste Disposal account will be scored as a reduction in current budget authority in the Defense Nuclear Waste Disposal account, resulting in net budget authority of $73 million.

In addition, $258 million in new budget authority is requested from the Nuclear Waste Disposal Fund for the Nuclear Waste Disposal account. Under the scorekeeping guidelines adopted under the Budget Enforcement Act, the $39 million transfer will be scored as an increase in current budget authority in the Nuclear Waste Disposal account, resulting in net budget authority of $297 million

[g] The outyears shown here are preliminary, and do not necessarily reflect program requirements. Future budget requests for the program have yet to be established and will be determined through the annual executive and Congressional budget process.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory	2,526	2,783	3,369	586	21.1%
Oakland Operations Office					
Lawrence Berkeley Laboratory	9,785	7,648	6,066	-1,582	-20.7%
Lawrence Livermore National Laboratory	18,947	22,834	22,057	-777	-3.4%
Albuquerque Operations Office					
Sandia National Laboratory	11,306	13,546	11,172	-2,374	-17.5%
Los Alamos National Laboratory	14,130	12,536	11,204	-1,332	-10.6%
Nevada Operations Office[a]	217,641	235,378	289,782	54,404	23.1%
Nevada Test Site	8,000	4,690	4,914	224	4.8%
Nevada (Yucca Mountain Project Office)	12,512	12,668	10,939	-1,729	-13.6%
Oak Ridge Operations Office	254	264	275	11	4.2%
Oak Ridge Institute for Science & Education	27	28	29	1	3.6%
Oak Ridge National Laboratory	295	754	292	-462	-61.3%
Richland Operations Office					
Pacific Northwest Laboratory	1,244	1,264	779	-485	-38.4%
Washington Headquarters	49,333	43,607	48,122	4,515	10.4%
Total, Program	346,000	358,000	409,000 [b]	51,000	14.2%

[a] Includes Financial Assistance to the State of Nevada, and Affected Units of Local Government and includes funding for contracts administered in Nevada (i.e. Management and Operating Contractor, USGS, National Academy of Science, Universities, etc.)

[b] The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000.

Site Description

Argonne National Laboratory

In support of Design and Engineering, Argonne National Laboratory conducts waste form testing. The laboratory is also the custodian for new spent fuel approved test material.

Lawrence Berkeley Laboratory

In support of Core Science, Lawrence Berkeley National Laboratory conducts Unsaturated Zone flow and transport modeling, thermal hydrologic modeling activities, geophysics testing, and supports Drift Scale testing. LBNL also performs the seepage tests in the exploratory studies facility alcoves and niches. LBNL supports the abstraction activities needed to conduct the Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Lawrence Livermore National Laboratory

In support of Core Science, Lawrence Livermore National Laboratory conducts experiments and modeling activities needed for the repository design and to predict responses of the engineered and natural barrier systems to the heat generated by radioactive waste. The experiments include the Single Heater and Drift Scale tests in the ESF, the proposed heater tests in the Cross drift, and the Large Block test on the Fran Ridge at the site. In support of Design and Engineering, LLNL conducts testing and modeling of the waste package environment, waste package materials and waste forms. LLNL also supports the abstraction activities needed to conduct Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Sandia National Laboratory

In support of Core Science, Sandia National Laboratories conducts in-situ monitoring in the Exploratory Studies Facility and in the East-West drift, and performance confirmation testing. The laboratory conducts geoengineering and rock mechanics studies, and backfill analyses in support of Design and Engineering. The laboratory also supports Suitability/Licensing and Performance Assessment with performance assessment modeling.

Los Alamos National Laboratory

In support of Core Science, Los Alamos National Laboratory conducts geochemistry, mineralogy, and colloid transport studies. LANL conducts laboratory – and field-scale transport tests, including the Busted Butte Transport Test, and develops radionuclide transport models for the unsaturated and saturated zone groundwaters at the site. LANL corroborates with USGS on isotopic and groundwater chemistry investigations needed for transport models. In support of Operations/Construction, the laboratory coordinates testing at the Yucca Mountain site, including testing in the ESF. LANL also supports the abstraction activities needed to conduct Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Nevada Operations Office

In support of the Yucca Mountain Project and the OCRWM Program Direction, the Nevada Operations Office administers disbursement of External Oversight and PETT funds to affected units of government, and also administers contracts/agreements with: TRW Environmental Safety Systems as the OCRWM Management & Operating (M&O) contractor, the United States Geological Survey, the National Academy of Sciences, the University and Community College System of Nevada, Atomic Energy Canada Limited, Jason Technologies Corporation, Alpha Services , Science Applications International Corporation, Bechtel Nevada , and Wackenhut Services, Inc.

Nevada Test Site

In support of Core Science and Operations/ Construction at the Yucca Mountain Site, the Nevada Test Site, through Bechtel Nevada, provides NTS common site support such as: logistics, fire protection, security, emergency medical services, roads/grounds maintenance, environmental operations, vehicle/construction equipment maintenance, facility maintenance, bus transportation, janitorial and refuse services, and power usage.

Yucca Mountain Project Office in Nevada

The Yucca Mountain Project Office in Nevada has the primary responsibility for the characterization of the Yucca Mountain site, and if the site is suitable, for preparing and submitting a license application to the Nuclear Regulatory Commission for construction of the repository. As the future owner and licensee of the repository, DOE develops and implements policies and strategies for the work to be completed and oversees the management and operating contractor and the United States Geological Society in performing this work. YMSCO manages the contracts for the management and operating contractor and the support services contractors for work at Yucca Mountain.

Site characterization and license preparation activities include developing and conducting surface-based and underground data collection and testing; design of the repository and waste package subsystems; developing and implementing environmental, safety and health policies; preparing the environmental impact statement; interacting with oversight and regulatory groups; and providing the necessary management and site infrastructure to support these activities.

Oak Ridge Institute for Science and Education

In support of Program Management, the Oak Ridge Institute for Science and Education administers undergraduate and graduate educational programs.

Oak Ridge National Laboratory

In support of Design and Engineering, the Oak Ridge National laboratory provides support in analyzing commercial reactor criticality data, radiochemical assays and uncanistered fuel design. The laboratory also provides technical support for the disposal criticality topical report, thermal/neutronics model and criticality analysis process report.

Pacific Northwest Laboratory

In support of Design and Engineering, the Pacific Northwest Laboratory provides waste form testing support.

Yucca Mountain Site Characterization

Mission-Supporting Goals and Objectives

Our Nation's commitment to geologic disposal as the basic goal of its waste management policy is essential not only for addressing the problem of disposition of commercial spent fuel, but also for cleaning up the nuclear weapons complex, complying with the international nonproliferation policy, supporting the international consensus on permanent disposal of nuclear waste, and fulfilling the national defense mission. Permanent disposal of civilian- and defense-related high-level radioactive waste will enable the Nation to continue to demonstrate leadership and advance nonproliferation goals by moving forward with its plans for the disposition of fissile materials, as well.

Substantial and demonstrable progress has been made toward reaching a decision on the suitability of the Yucca Mountain site. In FY 1996, the *draft Civilian Radioactive Waste Management Program Plan, Revision 1, issued May 1996*, placed the focus of the Program on completing the necessary technical and scientific work at the Yucca Mountain site to maintain the long-term objective of initiating repository operations in 2010. Over the past four years, the Yucca Mountain Site Characterization Project has focused its activities on site characterization, principally to develop subsurface laboratories. If the site proves suitable and the Secretary of Energy decides to recommend the site for repository development, a Site Recommendation Statement will be prepared and submitted to the President in 2001. If the President, and then Congress, approve the Site Recommendation, a License Application will be prepared and submitted to the Nuclear Regulatory Commission in mid-2002.

The *revised Program Plan* outlined the steps necessary to streamline and focus the repository program at Yucca Mountain. The refocused set of activities enabled the Program to retain the schedule for completing a License Application while increasing funding needs in the post-FY 1996 time frame only moderately. The Program is implementing the scientific and technical activities at the Yucca Mountain Site Characterization Project in accordance with the recently issued Viability Assessment.

In addition, the Program will focus on assisting the Russian Federation in developing geologic repository alternatives to current radioactive waste management practices and use of Russian scientists and engineers for furthering nonproliferation objectives.

The focus in FY 2000 is on completing the technical work necessary to determine whether the Yucca Mountain site is suitable for development as a geologic repository and on developing the documentation needed to support a Secretarial decision on Site Recommendation. The Program has made significant progress and is well poised to complete the technical work necessary to support a decision by the Secretary of Energy on whether to recommend approval of the site in FY 2001. This work includes an evaluation of compliance with 10 CFR 960, the Department of Energy's siting guidelines. Additionally, the FY 2000 activities include a major international component.

In FY 1999, the Program continues to gain momentum toward a Secretarial decision on a Site Recommendation and License Application by:

- Publishing the Viability Assessment of a Repository at Yucca Mountain to support policy decisions on proceeding toward Site Recommendation and License Application.
- Completing a draft Environmental Impact Statement.

- Completing the formal, independent peer review of the Total System Performance Assessment documentation for the Viability Assessment to support development of the Total System Performance Assessment for a Site Recommendation Statement and License Application.
- Completing repository and waste package designs for use in developing the Total System Performance Assessment and other documentation for a Site Recommendation Statement and License Application.

In FY 2000, the Yucca Mountain Site Characterization Project will continue to build on these achievements. The Nuclear Waste Policy Act of 1982, as amended, prescribes the steps and contents for the statement that must accompany a Site Recommendation. Efforts will focus on development of the technical bases and draft documents that the Department of Energy will incorporate into a Site Recommendation Statement in FY 2001.

The following product-oriented performance measures are planned for FY 2000 in support of a Site Recommendation Statement and License Application:

- Select the natural system reference models to support a decision to recommend the Site and the License Application.
- Select the reference design to support a decision to recommend the Site and the License Application.
- Complete and issue the final Environmental Impact Statement.

In addition to these performance measures, the following key accomplishments also are planned for FY 2000 in support of a Site Recommendation Statement and License Application:

- Evaluate the Yucca Mountain site for compliance with 10 CFR Part 960, the Department of Energy's repository siting guidelines.
- Initiate development of the documentation that will support a Secretarial decision on Site Recommendation.
- Complete an internal review of the Working Draft License Application.
- Initiate development of the Acceptance Draft License Application to incorporate new design information and feedback from review of the Working Draft License Application.

Other key activities will continue beyond FY 2000, as follows:

- In FY 2001, hold public hearings on the Secretary of Energy's consideration of the possible recommendation of the site for development as a repository.
- Complete the final 10 CFR Part 960 compliance evaluation to document whether the site meets the specified siting guidelines, as input to a Site Recommendation Statement.
- In FY 2001, complete a departmental review of the Site Recommendation Report that will provide the technical bases for a Site Recommendation Statement.
- In FY 2001, finalize a Site Recommendation Statement for the Secretary of Energy to submit to the President and then Congress (if the Secretary decides to recommend the site). The Site Recommendation Statement will include the Site Recommendation Report, final Environmental Impact Statement, and other information required by the Nuclear Waste Policy Act of 1982, as amended.

- In FY 2002, submit a License Application to the Nuclear Regulatory Commission (if the President and Congress approve the Site Recommendation). This activity will initiate the Licensing Phase of the repository program. Formal licensing activities will continue for the remainder of FY 2002 through FY 2005.

Funding Schedule[a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000[a]	$ Change	% Change
Core Science	73,669	74,832	73,959	-873	-1.2%
Design and Engineering	62,888	78,394	91,539	13,145	16.8%
Suitability/Licensing and Performance Assessment	31,143	53,130	61,192	8,062	15.2%
National Environmental Policy Act	4,254	1,962	2,343	381	19.4%
Operations/Construction	47,814	34,203	42,705	8,502	24.9%
Project Management	36,042	28,234	37,600	9,366	33.2%
External Oversight and Payments Equal to Taxes	11,900	11,659	22,329	10,670	91.5%
Total, Yucca Mountain Site	267,710	282,414	331,667	49,253	17.4%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Core Science

The Core Science activities focus on investigating the geologic conditions of the Yucca Mountain site and determining the ability of Yucca Mountain to act as a natural barrier to radionuclide release into the environment. Core Science activities include collecting and testing geologic, hydrologic, geochemical, and geomechanical site characterization and performance confirmation data from the subsurface and surface. The ongoing collection of data through FY 2001 will include data from short- and long-term testing programs (both on the surface and underground) that produce quality field and laboratory measurements for use in conceptual and

[a] The Budget requests a total of $409 million in budgetary resources for the Civilian Radioactive Waste Management Program in FY 2000. This sum includes a request for new budget authority totaling $370 million, as well as a request that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

numerical process models and engineering design calculations. These data will provide an increased understanding of the hydrology, geology, and geochemistry of the site and supply information on how thermal, hydrologic, chemical, and mechanical processes behave in the immediate natural environment. Other Core Science activities include collecting and monitoring environmental data to ensure compliance with regulatory requirements; testing material performance; planning, formulating, modeling, and testing scientific hypotheses; completing models and reports and collaborating with Russian scientists and engineers on characterization issues of mutual interest. The data collected will be used in the documentation that supports the major program products (e.g. Environmental Impact Statement, Site Recommendation Statement, License Application). The nonproliferation objective is to promote the concept of geologic disposition alternatives in Russia for Russian-generated spent nuclear fuel, high-level radioactive wastes, and post-cold war surplus materials.

Additionally, under a cooperative agreement, the University and Community College System of Nevada will continue to provide the public and the Yucca Mountain Site Characterization Office with an independent, unbiased body of scientific and engineering data concerning the study of Yucca Mountain as a potential high-level waste repository.

The key activity for Core Science in FY 2000 involves selecting natural system reference models used to support development of the Site Recommendation Report and License Application. To successfully complete this activity, we will:

- Select the near field environment (NFE) model
- Select the unsaturated zone (UZ) flow and transport model
- Select the saturated zone (SZ) flow and transport model

The Core Science subelement is divided into five key areas: Data Interpretation and Modeling, Testing to support a Site Recommendation, Testing for License Application, Testing for Licensing Phase and Performance Confirmation, and Environmental Monitoring and

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Compliance.

- **Data Interpretation and Modeling**—Data interpretation and modeling are essential end products of the site characterization activities. Nuclear Regulatory Commission regulations require numerical predictions of the effectiveness of the multiple barrier concept to mitigate a potential release to the natural environment and minimize radionuclides transport to potential human receptors. Both conceptual and numerical models of the natural barriers surrounding the waste packages have been developed for three increasingly larger areas—drift-scale, site-scale, and regional-scale. The drift-scale covers the size of a waste emplacement drift, which is five meters in diameter by approximately 40 meters in length. The site-scale is approximately 30 by 40 kilometers and is correlated to the repository operations area; and the regional-scale is approximately 245 by 230 kilometers. These models will be updated and refined as new information is collected through Site Recommendation, License Application, and performance confirmation testing.

  Specific performance measurement goals include data interpretation and modeling of the unsaturated zone, saturated zone, and near field (including approximately 10 process models, 8 abstraction models, and input data sets) for selection of the natural system reference models for the near-field environment and flow and radionuclide transport in the unsaturated and saturated zones. The input data sets for equivalent continuum models of lumped fracture parameters in the host rock are obtained from inverse modeling of the calibrated mountain-scale (i.e., hundreds to thousands of meters) simulation. The input data sets are adjusted for model scales and model codes.

  We will continue with the cooperative agreement ($10M) between the Department of Energy and the University and Community College System of Nevada to collect scientific and engineering data on Yucca Mountain. These scientific research activities will investigate areas of seismic activity, regional water resources, regional groundwater modeling, and moisture migration in the mountain.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
We will continue to work with Russian scientists and engineers at the closed city of Krasnoyarsk-26 to study the thermal effects analogue for Yucca Mountain. In addition, we will conduct exchanges of world-class expertise in system analyses, performance assessment, and risk assessment modeling for geologic disposal with former Russian weapons scientists and engineers from closed nuclear cities ($1.9M).			
Some work ($2.4M) originally planned for FY 1999 has been deferred to FY 2000, including collecting data to verify and supplement the data used in the UZ, SZ, NFE transport models; and precipitation and infiltration into the mountain	9,000	22,100	24,400
▪ **Testing to Support the Site Recommendation Report**— This testing provides the technical foundation for data and analyses of the natural system relating to the safety and the relationship between the geologic environment and the waste packages. Data available by the first quarter of FY 2000 will be used for analyses in the Site Recommendation Report. For the remainder of FY 2000, several of the same information networks will continue to acquire new data for use in the next phase of the Project (License Application) under Testing for License Application. Therefore, no funding will be necessary for testing to support a site recommendation in FY 2000 due to the transfer of activities to License Application testing.			
FY 2000 also includes $1.5 million in work originally planned for FY 1999 but deferred to FY 2000.....	15,000	35,102	7,000
▪ **Testing for License Application**—License Application testing, including enhanced characterization of the repository block, builds on the data acquired for the Site Recommendation Report. Data available by the end of FY 2000 will be used in the License Application. However, data-gathering activities will continue for performance confirmation testing. Results of subsurface investigations will support the hydrologic process models, Total System Performance Assessment for the decision whether to recommend the Site and the License Application, and repository design. Subsurface activities will complete the analyses of secondary minerals sampled in the			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
tunnel walls and estimate past percolation flux. Surface-based activities will include tracer-complex testing to acquire additional data on groundwater flow and radionuclide transport in the saturated zone. FY 2000 also includes $2.6 million in work originally planned for FY 1999, but deferred to FY 2000. This work includes testing in the Enhanced Characterization of the Repository Block (ECRB) Crossover and Infiltration alcoves and niches. This testing will provide data on hydrology in the unsaturated zone, infiltration and interaction of the geologic fracture and matrix.....	22,753	3,000	27,600
▪ **Testing for Licensing Phase and Performance Confirmation**—Licensing Phase testing activities include gathering data from an existing monitoring network that will gradually expand as testing for a decision regarding the Site and License Application come to a close. Measurement devices installed during these test periods will become part of the Testing for Licensing Phase network. Currently, Licensing Phase monitoring includes the extensive measurement network used to monitor seismic activity at approximately 24 locations on and around the Yucca Mountain site, as well as some of the underground instrumentation in the alcoves and niches associated with the Exploratory Studies Facility. Testing for Licensing Phase testing does not include the additional environmental monitoring covered under Environmental Monitoring and Compliance.			
▪ Performance Confirmation is required by 10 CFR 960 to confirm that subsurface conditions and changes in those conditions are within the limits stated in the License Application and that natural and engineered systems and components are as anticipated. Performance confirmation activities will assist in defining the performance confirmation baseline, predicting values and variations of critical performance parameters, establishing limits on deviations from predicted performance, conducting tests, and collecting data. Performance confirmation activities include long-term testing and monitoring, drift-scale thermal testing,			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
confirmation testing, subsurface testing, and surface-based testing. These activities will continue through repository analyses, which may be necessary for an updated License Application prior to repository operations.			
The budget request for Licensing Phase testing and performance confirmation may increase as monitoring points are added at the end of the testing periods and other testing requirements are identified by the Nuclear Regulatory Commission.	13,416	2,000	2,000
▪ **Environmental Monitoring and Compliance**—Environmental monitoring and compliance activities, as regulated by various statutes and regulations (e.g., Clean Water Act; Endangered Species Act; Federal Land Policy Management Act; Comprehensive Environmental Response, Compensation, and Liability Act), provide environmental and socioeconomic baselines through ongoing monitoring activities and ensure that site characterization continues by acquiring and maintaining the required permits. These activities also ensure regulatory compliance by conducting surveillances, audits, and assessments of site activities.			
Environmental monitoring and compliance activities provide scientific support for preparation of the Environmental Impact Statement. Data gathering and reporting of meteorological conditions provide direct support to design and engineering, Total System Performance Assessments, and analyses of potential radiological doses. These same meteorology data also are necessary to demonstrate that the requirements of preclosure radiological safety, regional airflow patterns, and extreme weather conditions relative to population centers can be met. It is anticipated that environmental monitoring and compliance activities will remain level through FY 2001 and then decline somewhat with decreased overall project activities prior to submitting the License Application.			
Additional environmental monitoring and compliance activities planned for FY 2000 through FY 2002 include scientific and engineering reviews of hazardous and solid waste handling and repository designs to ensure regulatory compliance; comment resolution support for environmental and			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
socioeconomic issues on the draft Environmental Impact Statement from the State of Nevada, affected units of local government, affected Indian tribes, and the public; and support for preparation of the final Environmental Impact Statement and technical documentation for the proposed Site Recommendation Statement and License Application.			
FY 2000 also includes $600 thousand in work for biosphere modeling originally planned for FY 1999, but deferred to FY 2000	13,500	12,630	12,959
Total, Core Science	73,669	74,832	73,959

Design and Engineering

In FY 1999 and FY 2000, refinement of the preliminary repository and waste package designs will continue to provide more detail. In addition, a quality assurance verification of the design to be used in the Total System Performance Assessment for License Application will be completed. Three key design options that would enhance repository performance will be evaluated for the Working Draft License Application. These options include: backfilling the emplacement drifts; installing drip shields over the waste packages to keep water from contacting the waste packages; and coating the waste packages with a ceramic material. In addition, several key design alternatives will be evaluated for the Working Draft License Application as proposed in the Viability Assessment, Volume II. These alternatives include continuous ventilation of the wastes, both pre- and post-closure; different waste package designs and materials (depending on the waste type); lower thermal loads in the underground emplacement drifts; self-shielded waste package designs that eliminate most underground remote handling operations; and different waste package emplacement configurations (in-drift, in-floor emplacement).

In FY 2000, the reference design to support the Site Recommendation Report and License Application will be selected and documented. These design documents will include safety and accident analyses and will describe the design in sufficient detail to show whether the repository can be operated safely during waste emplacement in

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Yucca Mountain and after all waste packages have been emplaced (i.e., preclosure period).

The design will progress and culminate in a License Application design submittal. The design will continue to be developed after the responses to the Nuclear Regulatory Commission's comments on the License Application have been incorporated. The design effort will support procurement of construction contractors and materials, as well as actual construction of the repository facilities and fabrication of the waste packages. These activities currently are scheduled to begin in FY 2005.

Important areas of ongoing design emphasis include waste package materials; waste form testing and analyses; waste handling system and emplacement operations; a description of how the Monitored Geologic Repository would operate (i.e., repository concept of operations); a demonstration of design compliance with codes, standards, and regulatory requirements (i.e., design verification); assurance that the technical work being performed within the individual engineering specialties is integrated (i.e., interface control); and detailed engineering for these elements of the repository system that show no similarities to systems licensed previously in commercial nuclear power plants.

The ongoing Monitored Geologic Repository design alternatives evaluation (planned for completion in 1999) will result in the selection of a repository/waste package design concept for the License Application. The design concept will, most likely, result in additional features that will require detailed design analyses, as necessary, for licensing. The key activity for FY 2000 in design and engineering involves decisions on the design and options that will be presented in the License Application. In addition, the materials selected for potential new waste packages or engineered barrier system components may require additional testing and fabrication or weld development.

Waste forms that we plan on placing in the repository include spent nuclear fuel from commercial nuclear power plants, spent nuclear fuel and high-level waste from the Department of Energy, fuel and mixed oxide spent nuclear fuel from the Navy, and immobilized plutonium. The repository design must accommodate the varied

(dollars in thousands)

FY 1998	FY 1999	FY 2000

characteristics (e.g., size, weight, radioactivity, heat) of these fuels in the repository design. Development of repository acceptance criteria (e.g., disposal interface specifications) for noncommercial spent fuel will continue.

The design and engineering subelement consists of three major areas—Waste package development, Repository Design, and Systems Engineering. Waste Package development includes two very distinct areas of technical activity—waste package design and waste forms and waste package materials testing. Repository design also includes two distinct areas of technical activity—subsurface facilities design and surface facilities design. Systems engineering integrates all aspects of design and demonstrates that the Monitored Geologic Repository (as designed) will perform safely and efficiently.

- **Waste Package Design**—Spent nuclear fuel and high-level waste—the primary waste forms planned for disposal in a deep geologic repository—contain highly radioactive materials (i.e., radionuclides). To safely and consistently handle these materials and other types of waste forms, the high-level waste will be sealed in containers (i.e., waste packages) prior to disposal in a Monitored Geologic Repository. Waste packages are being designed primarily to provide a way to safely handle waste during repository operations, contain and isolate the waste from the environment while in the repository, and prevent criticalities (e.g. nuclear chain reactions) from occurring during repository operations and after permanent closure of the repository.

  The waste packages are especially complex because they are first-of-a-kind designs that must safely contain the waste in the repository environment for thousands of years. The Nuclear Regulatory Commission has never licensed such a container.

  This activity provides structural, thermal, radiation shielding, criticality, and operational analyses to demonstrate viable waste package designs and new concepts for all waste forms; provides support for resolution of waste package viability issues and evaluation of waste package design licensing issues; develops engineering/design requirements; conducts short-term corrosion experiments and initiation of long-term corrosion tests to support development of

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
materials process models for new or modified waste package and engineered barrier system components; develops fabrication and welding verification methods; prepares cost estimates; evaluates alternative design concepts and selects the preferred design; provides waste package design information to the Total System Performance Assessments; and initiates designs to support waste package procurement. Hundreds of distinct activities (e.g. structural, thermal, radiation shielding analyses) to demonstrate viable waste package designs will be conducted. The increase from FY 1999 to FY 2000 reflects increased design activities to complete the Site Recommendation Statement and begin final design activities for License Application.			
FY 2000 also includes $1.5 million in work originally planned for FY 1999 but deferred to FY 2000. This work includes design of the waste package prototype, testing and fabrication	11,200	14,855	17,800
▪ **Waste Forms and Waste Package Materials Testing**—The materials selected for fabricating the waste packages must be capable of isolating waste forms for thousands of years from water that may seep into the underground openings where the waste packages are located (i.e., emplacement drifts). Long-term containment of the waste will allow most of the radionuclides to decay into stable elements before potential release to the surrounding rock. Waste forms and waste package materials testing activities are conducted primarily to provide input to models that will predict how waste package materials and waste forms will eventually degrade and allow the release of radionuclides into the natural barriers of the repository rock. These process models provide important tools to help select waste package materials and conduct performance assessment radionuclide release evaluations.			
This activity provides support for and development of process models; performs long-term degradation experiments and analytical studies; conducts performance confirmation testing of waste package materials and waste forms; performs long-term corrosion tests (24 test vessels); conducts design-specific tests (e.g., effects of machining, behavior of			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
the weld/material interface); determines the adhesion and protection characteristics of ceramic coatings; conducts stress-corrosion cracking tests; and develops models that describe and predict actual corrosion phenomena at the material/environment interface under various conditions. A significant number of test vessels will be used to perform hundreds of long-term tests and experiments.	11,200	16,355	16,400

- **Subsurface Facilities Design**—A subsurface repository would be exposed to environmental conditions significantly different from those encountered in standard mining practices (e.g., expected temperatures due to thermal radiation from the spent nuclear fuel would exceed the boiling temperature of water). Since there are no operating geologic repositories for high-level nuclear waste anywhere in the world, in this type of geologic medium, the subsurface design is a first-of-a-kind. The subsurface design consists of drawings and specifications for structures, systems, and components supported by analyses and trade-off studies. Subsurface structures include the ventilation shafts, access ramps, access tunnels, and emplacement drifts. Subsurface systems include ground support, ventilation, fire protection, data gathering and monitoring, communications, enunciated alarm systems, and performance confirmation. Major subsurface components include the waste transporter and emplacement gantry crane.

  Because of the nature of radioactivity, design efforts also focus on structures, systems, or components that serve to protect worker or public health and safety. Aspects of the repository design that contribute to the prevention or limitation of the potential release of radioactivity to the environment are identified as "safety-related." Subsurface design work is prioritized first on unique-to-a-repository, safety-related items that have no regulatory precedent; second on safety-related items that the Nuclear Regulatory Commission is familiar with because they have licensed similar items at nuclear power plants; and third on nonsafety-related structures, systems, and components that are necessary for operation.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
This activity provides subsurface facilities design support, including developing several thousand designs, drawings, and analyses for safety-related systems with and without previous Nuclear Regulatory Commission licensing precedence; evaluates waste package transport system and engineered barrier system enhancements and modifications; evaluates and selects multiple design alternatives to be presented in the License Application; resolves subsurface design viability issues; evaluates subsurface facility design licensing issues; and prepares input to the Total System Performance Assessments. The budget request increases in FY 2000 as design activities increase to complete the design products for Site Recommendation Statement and begin final design for License Application.			
FY 2000 also includes $1.0 million in near field design work originally planned for FY 1999 but deferred to FY 2000	13,000	19,302	21,489

- **Surface Facilities Design**—Surface facilities are being designed to receive spent nuclear fuel and high-level waste transported to the Yucca Mountain site in shipping casks, remove these wastes from the shipping casks and place them into disposal containers (i.e., waste packages), seal the disposal containers by welding, and deliver the filled waste packages to a holding area in preparation for underground emplacement for a potential Monitored Geologic Repository.

  Major surface facilities include the carrier preparation building, waste handling building, waste treatment building, transporter maintenance building, site utilities, and other support facilities (e.g., warehouses, maintenance shops, administrative facilities). The shipping casks will be received from the rail or truck carriers at the carrier preparation building where they will be prepared for removal. Nuclear waste will be removed from the shipping casks and loaded into waste packages in the waste handling building. The low-level waste generated during waste handling operations will be prepared for disposal at the Nevada Test Site. Vehicles used to transport and emplace waste packages will be serviced at the transporter

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
maintenance building.			
The waste handling facility and operations have some unique design considerations. Although some of the waste handling operations are similar to those of a nuclear facility, such as handling spent nuclear fuel, the number of fuel assemblies to be handled is approximately 400 times greater than in a nuclear facility. The production rates for the repository waste handling facility hot cell activities are significantly greater, with 60-ton casks being remotely handled in hot cells. Package closure operations include welding a large number of disposal containers to remain competent for thousands of years.			
This activity provides surface facilities design enhancements or modifications, including developing thousands of design drawings and analyses for safety-related systems with and without previous Nuclear Regulatory Commission licensing precedence; resolves multiple surface facility design viability and licensing issues; and prepares input to the Total System Performance Assessments. The budget request increases in FY 2000 as design activities increase to complete the design products for the Site Recommendation Statement and begin final design for License Application.			
FY 2000 also includes $1.0 million in work originally planned for FY 1999 but deferred to FY 2000. This work includes waste handling building design and operation	8,488	8,871	11,550
▪ **Systems Engineering**—The potential Monitored Geologic Repository is a large, technically complex combination of scientific, engineering, and construction activities. Systems Engineering is used to coordinate and integrate these diverse activities to ensure that the License Application design meets the regulatory requirements to safely contain and isolate waste from the public and the environment.			
Systems engineering has four major roles in the development of a geologic repository. The first role is to translate the regulatory requirements into design criteria so the repository and waste packages can be designed to meet these requirements. This results in a hierarchy of requirements that must be complied with			

(dollars in thousands)

FY 1998	FY 1999	FY 2000

when developing detailed designs and specifications, as well as during construction. The second role is to review the repository and waste package designs as they progress from the conceptual through the preliminary and on to the final stages to ensure that the designs included in the License Application meet the regulatory requirements and are properly integrated throughout the design process. This activity is referred to as requirements and design verification. The third role is to assure the Department of Energy and Nuclear Regulatory Commission that the designs, as built, will operate in a cost-effective and efficient manner and that changes to the designs and specifications are documented and controlled in accordance with the approved quality assurance program. The fourth role is to develop an operations test program to demonstrate that the designs will operate as intended. This program, intended to test the operations of the actual facility, is developed during the design process and continues through the start-up phase.

Successful application of the systems engineering principles ensures that the performance of a Monitored Geologic Repository, as included in the License Application, is balanced against the construction and operation costs of the repository. This is accomplished through the use of benefit/cost analyses, design alternative evaluations, engineering trade-off studies, and operations analyses that support the development of the design and Total System Life Cycle Cost estimates. These activities are performed throughout the life of the Project to provide the proper balance between repository performance and cost, and they are documented to provide the technical bases that support the Nuclear Regulatory Commission licensing process. Professional estimators are also used to support engineering and construction planning activities.

This activity provides systems engineering and training support, includes preparing descriptions of how a Monitored Geologic Repository should operate; develops system description documents; conducts hundreds of design reviews to ensure that the designs are integrated and consistent with regulatory requirements; develops thousands of the technical bases (i.e., records) for the designs; determines the

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
completeness and cost-effectiveness of the designs through cost/benefit analyses and Total System Life Cycle Cost estimates; conducts hundreds of design analyses; and prepares plan descriptions to start and test the facilities' operations. Systems Engineering processes support the development of the technical basis for the License Application Design.			
FY 2000 also includes $1.5 million in work originally planned for FY 1999 but deferred to FY 2000. This work includes Site Recommendation/License Application design criteria and the Exploratory Studies Facility nuclear safety analysis	19,000	19,011	24,300
Total, Design and Engineering	62,888	78,394	91,539

Suitability/Licensing and Performance Assessment

The objective of the suitability/licensing and performance assessment activity is to first compile the technical documentation that will support a Site Recommendation Statement, and second, if the Secretary of Energy decides to recommend the site and the President and Congress approve the recommendation, to complete the License Application for repository construction, which will be submitted to the Nuclear Regulatory Commission by the Secretary of Energy. A draft Site Recommendation Report will be developed during FY 2000 to provide the technical bases required under the Nuclear Waste Policy Act of 1982, as amended, as part of the Site Recommendation Statement. This report, the final Environmental Impact Statement, and other information required by the Nuclear Waste Policy Act of 1982, as amended, will be considered by the Secretary of Energy in deciding whether to recommend the site to the President in FY 2001.

Before the License Application is submitted, the Department of Energy will work with the Nuclear Regulatory commission to resolve procedural and technical issues. The licensing process can be facilitated further by coordinating and participating in prelicensing interactions with the Nuclear Regulatory Commission to determine and agree on the content and level of detail required for the License Application. These interactions will enable the Nuclear Regulatory Commission to accept

(dollars in thousands)

FY 1998	FY 1999	FY 2000

the License Application for review upon submittal in FY 2002 and, if warranted, approve a construction authorization by FY 2005.

This budget subelement includes interactions with the Nuclear Regulatory Commission, Nuclear Waste Technical Review Board, and other external organizations that are intended to facilitate an understanding of the bases for the Site Recommendation Statement and License Application.

Complete program records are critical to the preparation of the Environmental Impact Statement, reports supporting a Site Recommendation Statement and License Application and for the Nuclear Regulatory Commission's license review process. All technical data used for the repository design, Total System Performance Assessment, and models for site processes and conditions must be traceable and electronically retrievable in accordance with 10 CFR 960 Part 2, Subpart J. The latest web-based technologies will be utilized to ensure that program data and records are quickly and easily retrievable at the time that the Secretary of Energy decides to recommend the site to the President.

Performance assessments are important in evaluating site suitability to support a Site Recommendation Statement and License Application. Performance assessments are needed to quantitatively evaluate the ability of the natural system and engineered barriers to meet postclosure performance objectives. Performance assessments are conducted to provide information on the performance of the total repository system in the postclosure period by making calculations to evaluate physical processes that affect potential migration of radionuclides and the potential doses to individuals living in the vicinity of Yucca Mountain in the distant future.

The key activity for suitability/licensing and performance assessment in FY 2000 is documentation of the base case for the Total System Performance Assessment that will support the Site Recommendation Statement and License Application.

The suitability/licensing and performance assessment subelement consists of four major areas: to support a decision on the Site; Licensing; Technical Information Management; and Performance Assessment. The performance assessments for closing out issues in the

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

Viability Assessment and Site Recommendation/License Application are discussed separately.

- **Site Recommendation**—The Office of Civilian Radioactive Waste Management will develop a Site Recommendation Report to support a Statement and submit it to the Secretary of Energy in FY 2001. The Report and a proposed Site Recommendation Statement will be based on an integrated description of the site characterization and design information developed by core science and design and engineering through mid-FY 2000 and the Total System Performance Assessment Site Recommendation/License Application that will be completed in early FY 2001. The Site Recommendation Statement will be supported by the results of an evaluation of the Yucca Mountain site's suitability for development as a repository under 10 CFR 960, the Department of Energy's siting guidelines. This suitability evaluation will begin in FY 2000 and be completed in FY 2001 to support the Site Recommendation Statement. The final Environmental Impact Statement, as well as other inputs required by the Nuclear Waste Policy Act of 1982, as amended, will be included as part of the Site Recommendation Statement. The Program will coordinate preparation and issuance of two Site Characterization Progress Reports.

  The estimate for FY 2000 reflects the staff hours that are expected to accomplish the planned work scope. This estimate is based on experience gained from developing and reviewing the Viability Assessment in FY 1998 and coordinating the development of the Working Draft License Application in FY 1999 for review in FY 2000, as well as previous experience in developing Site Characterization Progress Reports.. ..... 1,500 1,004 1,500

- **Licensing**—Licensing activities focus on compliance with statutory and regulatory requirements, interacting with the Nuclear Regulatory Commission and oversight groups, and developing the License Application. The License Application will be developed iteratively between FY 1999 and FY 2002.

  In FY 2000, the Program will coordinate the review of

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
the Working Draft License Application and development of the Acceptance Draft License Application to provide the required information to support the licensing review by the Nuclear Regulatory Commission beginning in FY 2002 (the License Application is expected to comprise several tens of thousands of pages). Ongoing activities include publishing Semiannual Site Characterization Progress Reports, which are required by the Nuclear Waste Policy Act of 1982, as amended, and Nuclear Regulatory Commission regulations; tracking agreements and commitments made with the Nuclear Regulatory Commission; and observing and commenting on proposed regulatory revisions being considered by the Environmental Protection Agency and Nuclear Regulatory Commission. The estimate for FY 2000 reflects the staff hours that are expected to accomplish the planned work scope. This estimate is based on experience gained from developing and reviewing the Viability Assessment in FY 1998 and coordinating the development of the Working Draft License Application in FY 1999 for review in FY 2000, as well as several years of interactions with the Nuclear Regulatory Commission, its staff, the Advisory Committee on Nuclear Waste, with the Nuclear Waste Technical Review Board and other external groups. The budget request for Licensing increases in FY 2000 to accommodate the review of the Working Draft License Application that will be developed during FY 1999 and to coordinate development in FY 2000 of the Acceptance Draft License Application, which must fully address the information required under Nuclear Regulatory Commission regulations and the comments resulting from the review of the Working Draft License Application.	4,680	17,705	19,492
▪ **Technical Information Management**—Technical information management activities consist of developing, maintaining, and enhancing an Integrated Electronic Information System, including hardware, software, and administrative controls. This system will support the development, documentation, and archiving of licensing information. The Integrated Electronic Information System will be a controlled			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
system for storing, disseminating, and archiving scientific and design data and controlling model development and design analyses by ensuring the accuracy and consistency of the technical information used.			
The Integrated Electronic Information System includes the Web-based information system, project electronic licensing document development and management system, records management system, and technical data management system. The records management system equates to the Licensing Support Network required by 10 CFR 960, Part 2, Subpart J. Each of these component systems will be fully linked so that licensing and supporting documentation is traceable and transparent to the references and data.			
The Web-based information system will be deployed to support development of the Working Draft License Application, and the technical data management system will be fully functional in FY 1999. The Licensing Support Network will be certified by the Department of Energy and ready for use in licensing proceedings prior to submittal of the License Application in FY 2002.			
This estimate is based on experience gained during FY 1998 and FY 1999 in processing existing and new records for electronic access. It also is based on the FY 1999 development and deployment for internal use of the Web-based information system to support development of the Working Draft License Application and the technical data management system. The budget for technical information management increases in FY 2000 because the Nuclear Regulatory Commission requires the delivery of an electronic docket at the time the site is recommended (planned for FY 2001).			
FY 2000 also includes $2.2 million in work originally planned for FY 1999 but deferred to FY 2000. This work includes processing data into the Technical Data Management System, increasing the efficiency in document development and control by developing an Electronic Data Management System and records reprocessing.	10,900	13,022	17,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▪ **Total System Performance Assessment—Site Recommendation/License Application**—Total System Performance Assessment—Site Recommendation/License Application will be developed based on the results of the Total System Performance Assessment—Viability Assessment and the final component of the peer review completed in FY 1999. The Total System Performance Assessment process will continue to serve as an integration tool for models and analyses produced by core science and design and engineering. This process, and the Total System Performance Assessment resulting from it, will be a key source of information critical to the FY 2001 decision whether to recommend the Site and FY 2002 License Application. In the Total System Performance Assessment-Site Recommendation/License Application, relevant abstracted model results, simplified process models, and design information will be combined with a reference case set of parameters to determine expected repository performance. The analyses will present the base case results showing the estimated dose to a human receptor at 20 kilometers downgradient from a hypothetical repository release. The release scenario is an occurrence of moisture in the unsaturated zone contacting the waste package for a sufficiently long time to corrode the metal container and carry the radionuclides to the water table (about 800 feet below the proposed repository horizon). This type of scenario is needed to evaluate potential impacts to human health and safety and to the environment to support the evaluation of site suitability, development of the remaining bases for the Site Recommendation Statement, and preparation of the License Application. This activity is labor-intensive with several computer simulations and interpretation of results. The budget request is estimated at $750,000 per month based on experience in developing the Total System Performance Assessment—Viability Assessment. FY2000 also includes $1.0 million in work originally planned for FY 1999 but deferred to FY 2000.	7,063	20,639	23,100
▪ **Total System Performance Assessment—Viability Assessment**—Total System Performance Assessment was a key component of the Viability Assessment in FY 1998. It served as an integration tool for models			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
and analyses produced by core science and design and engineering. Performance measures included simulated doses to affected populations and/or releases at specified boundaries. Total System Performance Assessment—Viability Assessment also presented sensitivity and uncertainty analyses to define key parameters that impact total system performance and to evaluate the significance of alternative assumptions in the overall prediction. Impacts of the Total System Performance Assessment—Viability Assessment on the scientific process models and design products were described, and recommendations were made for modifications that could significantly reduce uncertainty in the final dose calculations in the next performance assessment iteration. Results of the Total System Performance Assessment—Viability Assessment peer review, which will be completed in FY 1999, will be considered in the Total System Performance Assessment—Site Recommendation/ License Application.			
This activity was completed in the first quarter of FY 1999. The budget requirements in FY 2000, because all work related directly to this phase of performance assessment, will be finished with completion of and responses to the final report of the peer review panel in FY 1999.	7,000	760	0
Total, Suitability/Licensing and Performance Assessment..	31,143	53,130	61,192

National Environmental Policy Act

This subelement addresses the environmental data that will form the basis of the Environmental Impact Statement for a *Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada.* The Nuclear Waste Policy Act of 1982, as amended, requires that an Environmental Impact Statement be included in a Site Recommendation Statement and that the Nuclear Regulatory Commission, in granting repository construction authorization, adopt the Department of Energy's Environmental Impact Statement to the extent practicable. The National Environmental Policy Act process began in FY 1995 with the publication of a Notice

(dollars in thousands)

FY 1998	FY 1999	FY 2000

of Intent in the Federal Register, which initiated the public comment period on the proposed scope of the Environmental Impact Statement. As part of the scoping effort, 15 public meetings were conducted across the nation. Comments made at the scoping hearings were documented formally in a Comment Summary Document, which was issued in FY 1997. In FY 1999, the draft Environmental Impact Statement will be completed and issued for public review and comment. The public comment period will end in FY 2000. The final Environmental Impact will be published in late FY 2000. The final Environmental Impact Statement will evaluate potential environmental impacts associated with building, operating, and eventually closing a repository at Yucca Mountain. Data to support the Environmental Impact Statement will be generated by Core Science, Design and Engineering, and Suitability/Licensing and Performance activities.

This subelement includes three major activities to support development of the Environmental Impact Statement. The first activity involves performing environmental impacts and consequence analyses for each technical discipline in the Environmental Impact Statement (e.g., ecology, archeology, biology, meteorology, economics, and sociology). These impact analyses consider the results of the Total System Performance Assessment of the repository, estimate environmental consequences, and identify mitigation measures. The second activity involves conducting analyses in the technical areas that form the basis for and justification of the Environmental Impact Statement's conclusions. This process focuses on matters involving socioeconomic impacts, sensitive ecosystems, analysis of transportation impacts, issues of environmental justice, and analysis of repository performance and resulting environmental impacts during the preclosure and postclosure periods. The third activity involves further refining the technical analyses that support the Environmental Impact Statement after receiving public, agency, and tribal comments, as appropriate; supporting interdepartmental reviews; managing efforts to publish and distribute the document to all interested parties on a national basis in FY 2000; and continuing to maintain the administrative record.

The key activity for the National Environmental Policy

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Act in FY 2000 is publishing the final Environmental Impact Statement.			
▪ **National Environmental Policy Act**—To support the development of the Environmental Impact Statement, we will perform a environmental impact and consequence analyses; support Total System Performance Assessment analyses; identify mitigation measures; review draft and final text developed by the Environmental Impact Statement contractor; and interface with Department of Energy sites, headquarters organizations, regulatory and oversight organizations, and Department of Energy management on issues related to data collection and analyses for the Environmental Impact Statement. *Note that the cost of actually writing the Environmental Impact Statement is not included in this subelement. Those costs are included in Program Direction under support contractor scope.*	4,254	1,962	2,343
Total, National Environmental Policy Act	4,254	1,962	2,343

Operations/Construction

Operations/Construction activities include providing, maintaining, and managing the operating systems, structures, and construction necessary to support the Yucca Mountain site characterization effort. Operations activities include maintaining facilities and systems constructed to gather site characterization data; maintaining facilities in the central support area at the site; providing and maintaining site utilities and communications; and providing transportation for site workers. Construction activities include constructing and modifying test areas; changing the configuration of the ESF to provide a fully functional underground scientific research facility; and providing direct support for test setup and execution. Scientific and technical support facilities constructed to support testing include the Exploratory Studies Facility, Busted Butte Facility, Fran Ridge Facility, and various surface test drilling sites (boreholes). The Exploratory Studies Facility, which is the cornerstone of the underground characterization effort, includes the 5-mile Main-Loop, 1.7 mile Cross Drift, and 11 large test areas. These underground facilities are used

(dollars in thousands)

FY 1998	FY 1999	FY 2000

for scientific testing to enhance our understanding of the repository block; reduce characterization uncertainties ; confirm data; and support the Environmental Impact Statement, Site Recommendation Statement, and License Application. In FY 1998, the Cross Drift was excavated above the repository block to provide access to the western portion of the repository block. Construction of all major test areas to provide locations for scientific testing and data collection will be completed in FY 2000. This includes $3.5 million for cross-drift niches and alcove construction and Exploratory Studies Facility configuration modification originally planned for FY 1999. These test areas provide access for collection of observational and confirmatory data to support the data in the Viability Assessment and for the Site Recommendation Statement. The Central Support Area, originally constructed in the late 60s and early 70s, consists of existing buildings, roads, utilities, and communication systems that have been rehabilitated and are maintained to provide the necessary base of operations.

Out-year operations, including general test support and upgrading of the major Exploratory Studies Facility systems to provide and maintain a fully functional underground scientific research facility, will continue. In addition, minor construction will continue, as necessary, to upgrade existing testing areas. Safety and health programs also will continue to protect employees and the public, as will field support services provided by the Nevada Test Site.

The Operations/Construction subelement is composed of four key areas—Exploratory Studies Facility Operations, Exploratory Studies Facility Test Support and Construction, Site Operations and Test Support, and Safety and Health.

- **Exploratory Studies Facility Operations**—Exploratory Studies Facility operations ensure that this underground and other subsurface test locations, including the Busted Butte Unsaturated Zone Test Facility, are available for scientific study and ensure that the testing environment is consistent with programmatic and institutional requirements and continued site characterization. The Exploratory Studies Facility includes 25 major support systems that provide the necessary utilities to sustain life ,conduct

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
complex in situ laboratory experiments, and protect complex scientific equipment. The major support systems include ventilation, power, water, communications, ground support, underground transportation, and material and supplies handling.			
Continue provisions of the Exploratory Studies Facility support services (e.g., trash and refuse management, janitorial, drinking water, sanitation, vehicle fueling, access control, and underground transportation.			
Based on past experience, the average monthly cost to provide these services is $1.5 million. Costs associated with operations of the major support systems is expected to remain somewhat constant through License Application submittal.	18,314	16,380	17,500

- **Exploratory Studies Facility Test Support and Construction**—Construction activities include constructing and modifying test areas; modifying the configuration of Exploratory Studies Facility systems to provide a fully functional underground scientific research facility; resolution of Exploratory Studies Facility Title III engineering reports, and providing direct support for test setup and execution. All major site characterization construction was completed at the beginning of FY 1999 with completion of the Cross Drift. FY 1999 construction activities include resolution of Exploratory Studies Facility as-built issues, archival of Exploratory Studies Facility configuration files, and upgrading of Exploratory Studies Facility systems to provide a full functional underground scientific research facility. Planned Exploratory Studies Facility system work includes alignment of the Exploratory Studies Facility rail system and upgrade of critical electrical systems. Other activities will include technical support to construction tasks and construction support to the surface-based drilling program.

  FY 2000 also includes $3.5 million in work originally planned for FY 1999. This work includes cross-drift niches and alcove construction and replacement and upgrading of some of the Exploratory Studies Facility (which includes the electrical switch gear building, drainage channel, fencing, lighting, fire protection,

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
power distribution, and communications.			
As the level of construction and testing activities decreases, the support requirements also will decrease	15,200	5,247	10,500
▪ **Site Operations and Test Support**—Site operations and test support activities provide the laboratories, buildings, and services to support the 500 scientists and engineers working on site at Yucca Mountain, as well as approximately 3,500 visitors who tour the site each year. On-site facilities consist of buildings and associated utilities, motor pool, site roads, power, fuel, water distribution, and sewage collection. Support services include janitorial, refuse management, bus transportation, emergency medical services, field surveying, site security, tour coordination, material and property control, communications, and fleet operations. Site operations and test support also includes common field support services provided by the Nevada Test Site. Other surface and subsurface testing sites that are maintained on an ongoing basis include the C-Well Complex, Fran Ridge, and approximately 350 boreholes and 200 trenches and test pits. Site operations and test support is a long-duration task that spans the site characterization, licensing, construction, and operations phases.			
Site Operations and test support is expected to remain fairly constant through License Application submittal. The cost to provide surface operations and test support will be approximately $823 thousand dollars per month	11,600	9,876	11,250
▪ **Safety and Health**—Safety and health programs prevent or mitigate potential hazards during core science data collection, construction, and testing activities that form the scientific bases for the Site Recommendation Statement and License Application. These activities also are conducted to comply with the statutory and regulatory requirements of the Occupational Safety and Health Act and will continue through all phases of the repository program.			
Ongoing activities focus on protecting employees, members of the public, environment, and site workers from hazards that may result from the site			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
characterization activities. All aspects of the activities at the Yucca Mountain site recently completed the transition to the Office of Civilian Radioactive Waste Management Integrated Safety Management System. The Exploratory Studies Facility continues to be monitored for occupational health compliance with ventilation and air quality requirements for dust abatement and silica exposure mitigation. Medical emergency services, emergency management programs, fire prevention programs to support field activities, and safety and health programs complying with applicable requirements also are ongoing.			
As the level of operations/construction activities decrease, the cost of safety and health activities will decrease. However, specific safety and health activities planned for FY 2000 through FY 2002 will be expanded or reduced based on the hazard potentials and potential environmental risks in each phase of the project.	2,700	2,700	3,455
Total, Operations/Construction	47,814	34,203	42,705

Project Management Support

Project management provides support to technical and scientific programs allowing for the planning, funding, managing, measuring, and processing of data. Most importantly, project management activities support the program goals to complete the Site Recommendation Report to support a decision whether to recommend the Site and submit a License Application (if the site is determined to be suitable) by providing the systems and processes necessary to conduct institutional, scientific and technical activities. Specific project management activities include planning, scheduling, and measuring performance for all of the Yucca Mountain Site Characterization Project elements, as well as information technology and telecommunications management; lease scoring; office services, training, security, and procurement; facilities management and motor pool operations; records management; and technical document control. Project management also includes conducting public information and outreach programs to ensure that open and informative interactions with the public and program stakeholders are

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
continued.			
▪ **Management Support Activities**—Project Management activities that were completed in FY 1998 and are planned for FY 1999 through FY 2002 support the development of the Environmental Impact Statement, Site Recommendation Report, and License Application. Project management will include monitoring program activities to ensure compliance with applicable statutes, regulations, and Department of Energy orders and directives; planning, scheduling, budgeting, and measuring the performance of program activities to ensure that the Office of Civilian Radioactive Waste Management program objectives are met; monitoring program activities to ensure that they are accomplished in accordance with approved work scopes, authorized budgets, and scheduled milestones; providing program participants with facilities, equipment, systems, training, security, and support services needed to perform their approved activities; maintaining the information technology and telecommunications systems; maintaining records and technical references; managing the outreach program; and supporting public hearings on the Environmental Impact Statement and a decision to recommend the site, if determined suitable. Management support activities average 10 percent or less of the program budget. FY 2000 also includes $2.2 million in work originally planned for FY 1999 but deferred to FY 2000. This work includes information technology and telecommunications support	36,042	28,234	29,900
▪ **Lease Scoring**—Maintain current leases on office space, the current leases for office space in Las Vegas, Nevada begin to expire in FY 2000. Funding supports the minimum extensions (one-year to three-year, identified in the current contract) until new leases are negotiated and awarded.	0	0	7,700
Total, Project Management	36,042	28,234	37,600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
External Oversight and Payments-Equal-to-Taxes			
Financial assistance activities within the external oversight and payments-equal-to-taxes subelement provide the eligible units of government funds for conducting oversight and monitoring activities for the Yucca Mountain site characterization and offsetting lost tax revenues. Financial assistance for external oversight and payments-equal-to-taxes is required by the Nuclear Waste Policy Act of 1982, as amended. External oversight activities consist of financial and technical assistance to the State of Nevada and affected units of local government (i.e., Churchill, Clark, Esmeralda, Eureka, Lander, Lincoln, Mineral, Nye, and White Pine Counties in Nevada and Inyo County in California).			
Payments-equal-to-taxes are made to the State of Nevada and Nye, Clark, and Inyo Counties.			
▪ **External Oversight**—Financial assistance will be provided to the State of Nevada, Nye County, and nine counties adjacent to Nye County to allow participation in activities required under the Nuclear Waste Policy Act of 1982, as amended, [Section 116(C)(1)(A)].	5,000	5,930	12,329
▪ **Payments-Equal-to-Taxes**—Payments-equal-to-taxes will be provided to the State of Nevada, Nye, Clark, and Inyo Counties. The increase in FY 2000 is due to an expected increase in payments-equal-to-taxes to Nye County.	6,900	5,729	10,000
Total, External Oversight and Payments-Equal-to-Taxes...	11,900	11,659	22,329
Total Yucca Mountain Site Characterization.....	267,710	282,414	331,667

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. F Y 1999 ($000)
Core Science	
▪ The budget projected for Core Science stays relatively level in FY 2000 as the testing activities to support a decision whether to recommend the site draw to a close and testing for License Application increases. The funding for site characterization decreases but is affected by increases in external research under the cooperative agreement with the University and Community College System of Nevada and support for Russian Scientists and engineers on site characterization activities.	-873
Design and Engineering	
▪ The upward trend from FY 1999 to FY 2000 reflects increased design activity to complete to support a site recommendation report input and start final design activities for License Application. These activities include surface and subsurface design development, waste package design, waste forms, and waste package materials testing. Systems engineering functions support the development of the technical basis for the License Application design.	+13,145
Suitability/Licensing and Performance Assessment	
▪ The budget to support a decision on the site increases in FY 2000 to accommodate the effort required to coordinate preparation of the Site Recommendation Report and to initiate the review of this major statutory product. The budget for licensing increases in FY 2000 to accommodate the significant effort associated with the review of the Working Draft License Application that will be developed during FY 1999. The increase also covers additional staff resources necessary to coordinate development in FY 2000 of the Acceptance Draft License Application, which must fully address the information required under Nuclear Regulatory Commission regulations and the comments resulting from the review of the Working Draft License Application. The budget increases for Technical Information Management for FY 2000 to address the significant effort and staff resources necessary to satisfy the Nuclear Regulatory Commission's	

	FY 2000 vs. FY 1999 ($000)
requirement for electronic docketing for License Application. The budget increases for Performance Assessment in FY 2000 for two reasons. FY 2000 includes $1 million in Performance Assessment work originally planned for FY 1999 by deferred to FY 2000. The increase is also due to increased resource requirements needed to support Site Recommendation. Development and deployment of the Web-based information system for internal use will be completed in FY 1999. In FY 2000, this system will be available for use in developing the Acceptance Draft License Application and for eventual use in the Licensing Support Network being developed to provide the Integrated Electronic Information Management System, which is required under Nuclear Regulatory Commission regulations to provide electronic access to the records needed to support the licensing process	+8,062
National Environmental Policy Act	
▪ The budget for this subelement increases in FY 2000 to provide additional support for the public hearing during coordination of the final Environmental Impact Statement	+381
Operations/Construction	
▪ Cross-Drift construction (the last major construction project required for site characterization), north portal upgrade, and the unsaturated zone testing facility as part of the Exploratory Studies Facility underground laboratory will be completed in FY 1999. Emphasis in FY 2000 shifts to completing the testing activities.	+8,502
Project Management	
▪ Current lease agreements on facilities for Yucca Mountain begin to expire in FY 2000. The Project Management increase of $9.4 million is due a $7.7 million lease scoring requirement for one to three year extension of the current leases of approximately 206,000 square feet of office space and a $1.7 million increase in information technology in support of licensing activities.	+9,366
External Oversight and Payments-Equal-to-Taxes	
▪ External oversight is budgeted for the State of Nevada, Nye County, and nine counties adjacent to Nye County. Payments-equal-to-taxes	

	FY 2000 vs. F Y 1999 ($000)
are provided to the eligible government units. The increase in FY 2000 is due to a planned increase in payments-equal to taxes to Nye County as a result of site improvements and funding for the state which was not appropriated fully in FY 1999	+10,670
Total Funding Change, Yucca Mountain Site Characterization	+49,253

Waste Acceptance, Storage and Transportation

Mission-Supporting Goals and Objectives

The Waste Acceptance, Storage and Transportation (WAST) activities include: the development of processes for the legal and physical transfer of commercial spent nuclear fuel to the Federal Government; creation of a national transportation capability for waste acceptance and transportation; burn-up credit studies to take credit for the reductions in spent nuclear fuel reactivity resulting from fuel usage in a reactor; and resolution of institutional issues with Program stakeholders and the phasing out of discussions with the Nuclear Regulatory Commission for a storage facility design. The national transportation capability necessary to accept and transport spent nuclear fuel will utilize a market-driven initiative. This initiative involves a procurement process for contracts with the private sector to acquire needed waste acceptance and transportation services; it begins with the development of business plans, and includes a phase for mobilization and fabrication of canister, transport cask and storage modules, and a transportation operations phase. This approach offers a market stimulus for the commercial development of the equipment and management capabilities required for the transportation and storage of spent nuclear fuel.

The FY 2000 funding will provide for continuation of the core activities that will precede removal and transportation of spent nuclear fuel from reactor sites to a Federal facility. These activities include: collection and maintenance of spent nuclear fuel discharge information; development of procedures for verification of spent nuclear fuel parameters; maintenance and implementation of the Standard Contract; interactions with the International Atomic Energy Agency, the Nuclear Regulatory Commission, contract holders, and others concerning nuclear materials safeguards; interactions with stakeholders; and the development activities associated with the procurement initiative for waste acceptance and transportation equipment and services.

Spent Fuel Storage

This activity will be suspended in FY 1999, following receipt from the Nuclear Regulatory Commission of a safety assessment report for the Phase I Centralized Interim Storage Facility Topical Safety Analysis Report.

Transportation

This activity, which includes planning for the acquisition of a safe and cost-effective transportation capability, is being developed to utilize private sector entities to accomplish the Department's commercial spent nuclear fuel waste acceptance and transportation requirements. The proposed procurement has been structured in a phased process to facilitate competition and minimize contract risk to DOE. Development of the detailed plans for waste acceptance and transport, the fabrication of the transportation casks and related equipment, and the actual transportation services will proceed within the planned contract phases. The Department plans to complete development of the request for proposals for waste acceptance and transportation services in FY 2000, and issue it in FY 2001. This activity also includes the consideration and resolution of institutional issues and interactions with stakeholders, and technical assistance (Nuclear Waste Policy Act Section 180(c)) to states and tribes.

Waste Acceptance

The Waste Acceptance activity includes developing plans for achieving the legal and physical transfer of waste to the Federal Government from the owners and generators of spent nuclear fuel and high-level waste, once a Federal facility is ready to begin operations; supporting the transportation, storage and disposal of waste, once accepted; and developing recommendations for the Department's waste acceptance policy. Activities required to facilitate waste acceptance include: 1) development of a process for the orderly transfer of spent nuclear fuel and high level waste into the Federal system consistent with the needs of both the Federal Government and the owners and generators; 2) development of a plan to carry out the Program's waste acceptance responsibilities; 3) continuation of a collaborative dialogue with the Nation's nuclear utility companies as well as other owners and interested stakeholders; 4) verification of the fees collected for commercial spent nuclear fuel; 5) maintenance and implementation of the provisions in the Standard Disposal Contract; and 6) provision of contingency planning support, studies and analyses directed toward the market-driven initiative.

Project Management

Project Management and Administration consists of activities and tasks that support each of the product areas for the Waste Acceptance, Storage and Transportation Project. Specifically, the Project Management and Administration area includes the traditional areas of project management, project control, and technical and programmatic integration of tasks and activities across the Project.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Spent Fuel Storage	1,549	310	0	-310	-100.0%
Transportation	3,180	10	4,100	4,090	40900.0%
Waste Acceptance	523	916	1,030	114	12.4%
Project Management	695	614	600	-14	-2.3%
Total, Waste Acceptance, Storage and Transportation	5,947	1,850	5,730	3,880	209.7%

Detailed Program Justifications

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Spent Fuel Storage			
▪ Respond to the Nuclear Regulatory Commission questions and interact with the Commission during their review of the Centralized Interim Storage Facility Topical Safety Analysis Report Rev 0. The receipt of the Nuclear Regulatory Commission's safety assessment report for the non-site-specific Centralized Interim Storage Facility Topical Safety Analysis Report is expected in FY 1999. No activity is planned for FY 2000	1,349	310	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▪ Perform non-site-specific contingency planning for a Centralized Interim Storage Facility; maintain and update the database on industry developments for storage and transportation technology.....	200	0	0
Total, Spent Fuel Storage	1,549	310	0
Transportation			
▪ Prepare acquisition documents and technical specifications and issue for public comment the revised draft Request for Proposal (FY 1998), and support development during FY 2000 of the RFP for waste acceptance and transportation services including transport cask systems and auxiliaries (for issuance in FY 2001); develop procurement for market-driven waste acceptance and transportation services.....	1,855	0	3,700
▪ Review and revise Section 180(c) Notice of Policy and Procedures for implementing the Nuclear Waste Policy Act Section 180(c) and support preparation and evaluation of grant applications.....	200	0	200
▪ Continue stakeholder interactions.....	200	0	200
▪ Support ten cooperative agreements.....	625	0	0
▪ Submit an updated Actinide-only Burn-up Credit Topical Report to the Nuclear Regulatory Commission to take credit for the reductions in spent nuclear fuel reactivity as a result of fuel usage in a reactor.....	300	10	0
Total, Transportation.....	3,180	10	4,100
Waste Acceptance			
▪ Address Civilian Radioactive Waste Management System safeguards and security issues, implementing associated policies and procedures, and maintaining interface/liaison with other affected elements of the Civilian Radioactive Waste Management System.....	80	30	175

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▪ Process and verify utility fee payment data and develop quarterly revenue projections.....	270	270	270
▪ Develop Standard Disposal Contract modifications and/or deviations, as required, to support the waste acceptance process and Regional Servicing Contractor services acquisition processes. Maintain spent nuclear fuel storage data and assumptions; update Utility Storage Assessment model to include utility cost calculations, and industry forecasts to support Civilian Radioactive Waste Management System planning; and support development of waste acceptance criteria in FY 2000.....	73	423	379
▪ Implement the Standard Disposal Contract and other agreements; validate and disseminate utility supplied spent nuclear fuel discharge/storage data; update and publish the Acceptance Priority Ranking and Annual Capacity Report; and, prepare and distribute the updated Utility Spent Nuclear Fuel Discharge Projections and Analysis. Update verification requirements as required, including commercial and DOE owned spent nuclear fuel and high level waste; and support the litigation process.....	100	193	206
Total, Waste Acceptance	523	916	1,030
Project Management			
▪ Provide cost, schedule, planning, and integration related tools and services: cost and schedule baseline management; Strategic and Program Plan development/update; and project management documentation; Provide project control functions by monitoring cost, schedule and technical performance, performing variance analyses, and developing and implementing corrective actions.....	130	160	160
▪ Develop the Waste Acceptance, Storage and Transportation Annual Plan, and support the project validation review process; update the Project Cost & Schedule Baseline Project Summary Schedule work breakdown structure and dictionary and Long-Range Plan, as required.....	370	259	340

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▪ Maintain Waste Acceptance, Storage and Transportation life cycle cost estimate, support Total System Life Cycle Cost, and update Waste Acceptance, Storage and Transportation Project Life Cycle Cost Report; maintain and manage the technical baseline; conduct/coordinate system studies and analyses including the Waste Acceptance, Storage and Transportation Operations Plan; and perform/support verification and design control The Total System Life Cycle Cost Report will be issued in FY 1999 and updated in FY 2000	195	195	100
Total, Project Management	695	614	600
Total, Waste Acceptance, Storage and Transportation...	5,947	1,850	5,730

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Spent Fuel Storage	
▪ No Activity planned for FY 2000.....	-310
Transportation	
▪ The FY 2000 Budget Request assumes the Program will support issuance of a Request for Proposal for waste acceptance and transportation services, consistent with the Site Recommendation milestone.....	+4,090
Waste Acceptance	
▪ Increase is required to address Civilian Radioactive Waste Management System safeguards and security issues.....	+114
Project Management	
▪ Decrease reflects reduced system studies and analyses.....	-14
Total Funding Change, Waste Acceptance, Storage and Transportation.....	+3,880

Accelerator Transmutation of Waste

Mission Supporting Goals and Objectives

In FY 1999, funding was provided to assess the application of advanced accelerator technology to the transmutation of high-level defense waste. This work was coordinated with the activities being done in other offices on the development of high power accelerator technology.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Accelerator Transmutation of Waste	0	4,000	0	-4,000	-100.0%
Total, Waste Acceptance, Storage and Transportation	0	4,000	0	-4,000	-100.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▪ In FY 1999, the Department conducted a road mapping activity to identify the critical technical issues which must be resolved in order to establish the technical feasibility of the accelerator transmutation of waste (ATW). The study involved the design of an R&D program to address those issues, including schedule and cost. Opportunities for collaborative programs with foreign ATW efforts, as well as possible cooperative activities with other DOE accelerator programs, were identified. Institutional challenges were evaluated, and the impact on civilian radioactive waste management and other related programs was determined. Finally, the total life cycle cost to treat civilian spent nuclear fuel by ATW was estimated			
Total, Accelerator Transmutation of Waste	0	4,000	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Accelerator Transmutation of Waste	
▪ The FY 2000 Budget request no funding. Activities related to the identification of critical technical issues needed to determine the technical feasibility of this technology were completed.....	-4,000
Total Funding Change, Accelerator Transmutation of Waste.....	-4,000

Program Integration

Mission Supporting Goals and Objectives

Program Integration provides management support and program integration to the Program Director, the Yucca Mountain Site Characterization Project, and the Waste Acceptance, Storage and Transportation Project. Program Integration is comprised of the Office of Quality Assurance, Program Management and Human Resources and Administration. These offices are responsible for Program planning and management, Program integration, regulatory coordination, quality assurance, institutional activities, resources and information management, and international waste management activities.

Quality Assurance

This Program element identifies and ensures implementation of federally mandated requirements for Nuclear Quality Assurance (QA) applicable to the Civilian Radioactive Waste Management System (CRWMS) program activities related to radiological health and safety and waste isolation. It establishes and maintains a Quality Assurance Program formulated to ensure quality in activity planning and performance, thereby ensuring quality of the end-products. Documented compliance with these quality requirements establishes confidence in the effective implementation of the CRWMS program to support the execution and eventual licensing and/or certification of high-level nuclear waste operation activities.

Activities associated with the QA function, while performed by personnel not associated with the performer organization (NRC independence requirements), are directly related to the acceptability of the technical products and services provided by the performer organization. Before technical products and services can be deemed acceptable, reviews, audits, and surveillance (as appropriate) by the QA organization must be performed. QA is not an administrative function, but rather a necessary step (per NRC regulation) to assure technical acceptability such that we are confident in fulfilling our mission to protect the public, workers, and the environment. To maintain the high level of objectivity necessary to satisfy NRC requirements, the contractor support relied upon by the QA function must be independent of the Program's principal site investigators. The QA element achieves this independence by utilizing support service contract personnel who are independent of the Program's Management and Operations contractor. For this reason, all QA funding is displayed in the Program Direction element, and not in the budget elements where the substantive QA work is performed.

System Integration

The Systems Integration unit ensures development of an integrated waste management system, i.e., that the acceptance and transportation services component is compatible with the repository and waste package design activities and performs as a coordinated single system that meets mission requirements, and is safe, efficient, reliable, and cost-effective. This element coordinates policy, interprets technical requirements, and manages Program requirements documents. It maintains current descriptions of the overall waste management system, its components, and interfaces to enhance communication among parties responsible for individual system components assuring smooth flow at

interfaces. The unit operates and maintains the program-wide Configuration Information System (CIS) to track changes to baselined and controlled documents.

This element leads and coordinates interface activities with other Departmental organizations, including: Environmental Management (EM), Fissile Materials Disposition (MD), Nuclear Energy (NE), and Naval Reactors (NR). It also evaluates and defines criteria for acceptance of other waste forms for disposal; facilitates and implements Memoranda of Agreement (MOA) with Departmental waste generators; and identifies and assigns technical interfaces to appropriate Program elements.

The Systems Integration unit provides support and strategic planning assistance to the project offices and to the Director. This unit annually determines the adequacy of the fee charged to generators of commercial Spent Nuclear Fuel (SNF), in accordance with the Nuclear Waste Policy Act of 1982. Periodically, the Department's recommendation requires the conduct of Total System Life-Cycle Cost (TSLCC) analyses to support the determination of whether program revenues are sufficient to cover the cost of the program. Additionally, this unit conducts systems studies, tradeoff studies, sensitivity studies, and contingency analyses to ensure that the system-wide impacts of proposed changes are considered and alternative or contingency system configurations and concepts are evaluated.

Regulatory Integration

The mission of the Regulatory Integration unit is to ensure that the activities leading to the final waste management system, including commercial and Department-owned nuclear materials, are consistent with the regulatory guidance provided by the governing authorities. Regulatory activities include helping to ensure that project activities are consistent with Departmental policy and environmental impact statements for other Department programs. The focus is on plans and strategies for compliance with applicable statutes and regulations. The approach to accomplishing this mission is to conduct regulatory reviews, and continue interactions with several external oversight agencies, including the Nuclear Regulatory Commission (NRC), Environmental Protection Agency (EPA), and Nuclear Waste Technical Review Board (NWTRB). Interactions include addressing management and technical issues related to the repository project, interim storage, and transportation of spent fuel and high-level waste. Interactions with the NRC on licensing issues are critical to the success of the overall program schedule because they directly impact the NRC licensing process for program activities and facilities.

Strategic Planning

This element supports the Director's program planning requirements by integrating policy direction received from the Administration, Congress, and the Office of the Secretary into an overall program strategy. It provides resources for Program compliance with Departmental obligations resulting from the Government Performance and Results Act of 1993 and the Government Management Reform Act of 1994, including the DOE Strategic Plan, Annual Performance Plan, and Annual Performance Report, and supports the development and maintenance of multi-year and annual planning documents. This element also provides funding for responses to program inquiries, interface requirements with external program oversight parties and liaison activities with other related offices and programs with the Department.

International Waste Management

This activity keeps the Program abreast of international developments and new ideas, and affords the opportunity to influence international opinion and direction on strategies for disposition of nuclear materials. This unit assists in preparing for bilateral meetings and provides the Program's inputs to various international fact and information books.

Program Management

The key components of this element are business and management center planning, formulating and executing budgets and annual work plans, and establishing Program- and project-level cost, schedule, and technical baselines. Program Management provides the basis for: determining, prioritizing, and allocating Program resources; defining, costing, and executing work scope and schedules; and monitoring, analyzing, and improving Program performance.

Human Resources and Development

This activity supports the quality assurance training program at Headquarters and the review of quality assurance procedures impacting training and personnel verification activities.

Audits, Education and Information

This element encompasses diverse activities that support the Program's mission, including compliance with legislative requirements to develop and submit an Annual Report to Congress, develop and submit financial statements to the Department's Chief Financial Officer, develop and submit the Annual Assurance Memorandum to the Secretary, and develop and submit to Congress, OMB and GAO, Departmental responses to recommendations in GAO and DOE IG audit reports. Implementation of an appropriate investment strategy and the prudent management of the Nuclear Waste Fund investment portfolio are essential to fulfilling the Program's fiduciary responsibility under the Nuclear Waste Policy Act. Public information and education activities conducted by the National Information Center support the Nuclear Waste Policy Act objective of keeping the public informed of Program activities, and assist in building customer, stakeholder, and public confidence in and support for the Program. The Program's Historically Black Colleges and Universities Undergraduate Scholarship Program and Radioactive Waste Management Graduate Fellowship Program support the Department's compliance with Executive Order 12677 and the Secretary's science education initiative, as well as ensuring that the Program's future need for a diversified workforce of highly specialized scientists and engineers will be met.

Information Management

This activity encompasses the strategic application of information technology to: support the accomplishment of the Program's mission by providing integrated information systems, solutions and services that enhance the productivity of human resources, drive business process improvement efforts, reduce overall Program costs, and support "reinventing government" and Departmental strategic alignment initiatives. Information management activities include designing and developing information systems; providing a reliable infrastructure for effective and timely access to, and

communication of, information; ensuring integration and integrity of technical, regulatory, management, and financial information; streamlining of Program work processes through automation to reduce the paperwork burden and increase the productivity and job satisfaction of human resources; and promoting an organizational culture based on proactive planning, compliance with Federal and Departmental regulations, and responsiveness to Program dynamics; and supporting the collection and storage of records required for licensing.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	Change	% Change
Quality Assurance	0	0	0	0	0%
Program Management					
Systems Integration	2,719	3,143	3,265	122	3.9%
Regulatory Integration	364	763	763	0	0.0%
Strategic Planning	1,026	1,127	1,208	81	7.2%
International Waste	277	313	313	0	0.0%
Program Management	663	663	711	48	7.2%
Total, Program Management	5,049	6,009	6,260	251	4.2%
Human Resources & Administration					
Human Resources Development	90	89	93	4	4.5%
Audits, Education and Information	1,162	1,149	1,195	46	4.0%
Information Management	3,562	4,003	4,244	241	6.0%
Total, Human Resources Administration	4,814	5,241	5,532	291	5.6%
Total, Program Integration	9,863	11,250	11,792	542	4.8%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY2000

Program Management and Integration

Systems Integration

- Revise the CRWMS Program baseline to incorporate updated policies, Administration/Congressional direction, and requirements, such as incorporation of plutonium waste forms.

(dollars in thousands)

	FY 1998	FY 1999	FY2000
▪ Support the development of Project technical baseline and interface control documentation. Establish initial technical, cost, and schedule baseline for CRWMS through repository closure. Update Total System Description for the Program. Coordinate Program-level System Integration Design Reviews.			
Systems Analysis			
▪ Update CRWMS Total System Life Cycle Cost estimate and Report on Fee Adequacy to be consistent with repository License Application design and acceptance and transportation strategies. Conduct, review, and issue systems engineering logistics and waste stream analyses to support Program and project planning and project development. Develop and review cost assumption packages in support of the Total System Life Cycle Cost (TSLCC) analyses; maintain and enhance, as necessary, detailed cost and logistics computer models; and update cost databases.			
DOE Nuclear Materials			
▪ Implement required responsibilities established in the Memoranda of Agreement for acceptance of DOE SNF, DOE HLW, and Navy Spent Fuel. This includes support to the MOA Administrator, issuance of SNF and HLW data needs; development of acceptance capacities for DOE and Navy materials requiring acceptance, transportation, and disposal; establishment of fee payment schedules to ensure appropriate allocation of Congressional Defense Nuclear Waste Disposal Appropriations; and evaluation of credits for tax-payer expenditures which benefited. Develop, review, and publish technical baseline documentation and acceptance criteria for DOE Nuclear Materials, including system engineering requirements documents and interface control documents. Support control and distribution of Program level controlled documents.			
Configuration/Baseline Management			
▪ Monitor project level Baseline Change Control Boards' activities. Provide operations and maintenance support including training for the Program-wide CIS. Provide operations and maintenance support including training for the Program-wide CIS.			
Systems Integration.....	2,719	3,143	3,265

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Regulatory Integration

- Coordinate and participate in interactions with external agencies, such as: the Nuclear Regulatory Commission; the Environmental Protection Agency; and the Nuclear Waste Technical Review Board. These interactions include addressing management and technical issues related to the repository project, interim storage, and transportation of spent fuel and high-level waste

- Coordinate and integrate Program environmental, safety, and health activities to ensure compliance with Departmental directives and policies, EPA standards, NRC licensing requirements, and Occupational Safety and Health Act (OSHA) standards. Major activities include coordination of environmental impact statements from other Departmental Offices involving disposal of spent nuclear fuel, high-level waste and other Department-owned radioactive materials.

- Provide regulatory assessments and integration of storage, transportation, and disposal considerations for waste forms managed by other Departmental offices, such as Environmental Management, Fissile Materials Disposition, and Nuclear Energy (Naval Reactors), to ensure consistency with applicable interim storage, transportation, and repository requirements.

- Analyze proposed regulatory changes to determine impact on the Program and ensure compliance with newly promulgated rules. Provide continued support on emerging regulatory issues that will arise as the projects continue to move forward.

- Support activities leading to issuance of the final rule revising the Department's guidelines for determining site suitability for a repository.

- Support project activities associated with development of the license application plan, including coordination of relevant interactions with the Nuclear Regulatory Commission, Advisory Committee on Nuclear Waste, Nuclear Waste Technical Review Board and Congress.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▪ Provide oversight of and guidance on Program Safeguards and Security activities, including interface with Nuclear Regulatory Commission, Advisory Committee on Nuclear Waste and International Atomic Energy Agency.			
▪ Coordinate Headquarters review and formal approval of the draft and final environmental impact statement and Records of Decision, for a repository at Yucca Mountain. Provide coordination with Nuclear Regulatory Commission on issues related to the environmental impact statement.			
Regulatory Integration	364	763	763
Strategic Planning			
▪ Provide liaison with the Nuclear Waste Technical Review Board to address and resolve technical issues associated with site suitability activities. Provide technical, graphics, layout and editorial support in updating Program planning documents. Manage the Memorandum of Agreement with the U.S. Geological Survey for provision of analytical and technical support.			
Strategic Planning	1,026	1,127	1,208
International Waste			
▪ Assist in preparing for cooperative bilateral meetings and Nuclear Energy Agency Radioactive Waste Management Committee Meetings. Provide input to International Nuclear Waste Management Fact Book and update the Foreign Waste Management Programs Information Book.			
International Waste	277	313	313

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program Management			
▪ Improve program and project management systems. Finalize the integrated management policy document, and implement new policies accordingly. Support implementation of improved Departmental management policies			
Program Management	663	663	711
Subtotal, Program Integration	5,049	6,009	6,260
Human Resources and Administration			
Human Resources Development			
▪ Update course outlines, instruction guides and lesson plans for quality assurance training; develop training courses for new Administrative Procedures or Headquarters Local Procedures approved by the Office of Quality Assurance; and assist in the review of quality assurance procedures and documents that impact the training and personnel qualifications program. Assist in responding to Corrective Active Reports, Deficiency Reports, and the Quality Assurance Management Assessment. Purchase needed supplies, non-computer equipment, publications, and services.			
Human Resources Development	90	89	93
Audits, Education and Information			
▪ Produce reports and other documents required by Congress or the Department, such as the Program's Annual Report to Congress, audited financial statements, annual Federal Manger's Financial Integrity Act (FMFIA) reports, responses to General Accounting Office (GAO) and DOE IG audit recommendations, and Freedom of Information Act (FOIA) requests. Manage the Nuclear Waste Fund investment portfolio by providing monthly investment instructions to the CFO for implementation. Comply with executive orders and support the Department's education initiatives by conducting a Historically Black Colleges and Universities (HBCU) Undergraduate Scholarship Program and the Radioactive Waste Management Graduate Fellowship Program. Provide Program information to customers/stakeholders/public through the			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program's Home Page, direct responses to public inquiries and *The OCRWM Enterprise*, a semiannual newsletter.			
Audits, Education and Information	1,162	1,149	1,195
Information Management			
▪ Maintain existing information systems and networks. Validate Information Management (IM) Strategic Plan; revise/update IM Multi-Year Program Plan; develop integrated IM Annual Planning Guidance; conduct IM short-range planning and integrated IM budget planning.			
▪ Provide essential user support, training, Help Desk support, and records processing services.			
Information Management	3,562	4,003	4,244
Subtotal, Human Resources and Administration	4,814	5,241	5,532
Total, Program Integration	9,863	11,250	11,792

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Program Management	
▪ The slight increase in Program Management is required to assure that the major programmatic decision documents (i.e. Environmental Impact Statement, Site Recommendation and License Application) are sufficiently integrated through the Program, comply with regulatory requirements and meet the extensive documentation needs of a nuclear-related license application	+251
Human Resources and Administration	
▪ The slight increase in the Human Resources and Administration is required to maintain the Program's existing information management systems and networks	+291
Total Program Integration	+542

Program Direction

Mission Supporting Goals and Objectives

Program direction provides overall direction and administrative support for the Office of Civilian Radioactive Waste Program to manage and dispose of the Nation's spent nuclear fuel and high-level radioactive waste.

Program Direction has been grouped into four categories: 1) Salaries and Benefits; 2) Travel; 3) Other Related Expenses; and 4) Support Services.

Salaries and Benefits

This element includes compensation for regular salaries and wages paid directly to federal civilian full-time permanent and other than full-time permanent employees, other payments that become a part of the employee's basic pay rate and other personnel compensation such as overtime, holiday pay and cash incentive awards. Benefits includes payments such as the employer's share of employee retirement, health and life insurance, accident compensation, Federal Insurance Contribution Act taxes, and Federal Retirement Thrift Savings Plan. Benefits also include payments for former employees such as severance pay to employees involuntarily separated, and voluntary separation incentives. This includes payments to the unemployment fund, payments of nine percent of final basic pay to the civil service retirement fund for employees who took the early-out or buy-out authority, and payments to the Employees health benefits fund for annuitants.

Travel

This category provides funding for the transportation of Government employees, their per diem allowances while in authorized travel status, and other expenses incidental to travel that are to be paid by the Government either directly or by reimbursing the traveler.

Other Related Expenses

Other related expenses includes funding for building maintenance, rents, communications, utilities, computer/video support, printing and graphics, photocopying, postage, and supplies. The Working Capital Fund was established in FY 1997 by the Office of Human Resources to allocate the cost of common administrative services to the recipient organizations. Activities included in the Working Capital Fund include automated office support, telephone services, postage, printing and graphics, supplies, photocopying, building occupancy, contract closeouts and contract audits.

Support Services

Support Services include the following:

Environmental Impact Statement Technical Support – Specific technical scope for the Environmental Impact Statement contractor includes preparing the draft and final Environmental Impact Statements

using technical data developed by OCRWM and the Management and Operating contractor; and supporting public hearings.

The Nuclear Waste Policy Act, 1982, as amended, required that an Environmental Impact Statement be developed in accordance with the National Environmental Policy Act for inclusion in the Site Recommendation Statement.

The Environmental Impact Statement will evaluate three alternatives to help estimate the potential impacts of the proposed repository. These alternatives are based on how much heat the waste packages will generate once inside the repository and how this heat will be distributed (i.e., thermal load). Each assumption will reflect differences in the size of the subsurface repository, as well as the layout or configuration of the drifts and the spacing between them. These alternative conditions, in turn, will affect the prediction of the repository's long-term performance.

Quality Assurance Technical Support – Provide support in: complying with NRC requirements, developing and maintaining the OCRWM Quality Assurance Requirements and Description (QARD), developing Quality Assurance procedures, maintaining QA databases, developing and conducting OCRWM QA training and maintaining QA training records. Conduct audits, surveillance, on-site inspections, tests, and reviews of participant and vendor activities.

Support continued revisions to the Technical Baseline and continue the overview of DOE/Environmental Management production runs for acceptance of defense vitrified waste and DOE/Environmental Management qualification of Spent Fuel Site quality assurance programs.

Support the Waste Acceptance Storage and Transportation (WAST) Program element non-site specific design and engineering for an Interim Storage Facility (ISF) and issuance of draft RFP for Transportation, Storage Module, and Waste Acceptance services.

Support system integration, engineering activities, and continue to support EM vitrification and DOE and Navy owned spent fuel activities.

Management & Technical Support Services Provides an independent technical review capability of the work accomplished by the DOE National Laboratories and the management and operations contractor conducting the characterization of Yucca Mountain and the design and licensing of the potential geologic repository. Technical support services include the review and analysis of technical studies and papers and regulatory documents and reports, such as contractor deliverables, the Viability Assessment, Site Recommendation, and License Application. Facilitates independent peer reviews of plans, processes, and predictive models. Provides construction support services to review and analyze the designs and documents supporting licensing and construction. Provides Management services including independent analysis of the managing and operating contractor work plans, schedules and cost estimates.

Specific technical expertise required by OCRWM include environmental, safety and health; NEPA statutory requirements; licensing and NRC statutory framework; design, engineering, design analyses, design basis documents, and process models; scientific programs relating to geology, hydrology, rock mechanics, tectonics, and performance assessments; operations and construction; and project control; procurement analysis, and information management.

Automated Data Processing Support - Provide services to assist in the operation and management of the Office of Civilian Radioactive Waste Management communications network and computer facilities, including Web page development, computer hot line and help desk support, software and hardware installation and maintenance, and early evaluations of enhanced software.

Quality Assurance Management Assessment - Assists OCRWM in the annual quality assurance management assessment to comply with NRC licensing regulations.

Department of Energy Support Services - Provide automated data processing support services for Headquarters.

Technical Analysis Support Services- Provide analysis of spent fuel projections.

Administrative Support Services - Provide administrative services to the Yucca Mountain Site Characterization Office, including coordination of mail, correspondence, records submittal, office supplies, and facilities management services.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nevada Operations Office					
Salaries and Benefits	375	470	491	21	4.5%
Total, Nevada Operations Office	375	470	491	21	4.5%
FTE's	5	6	6	0	0.0%
Other DOE Matrix Support					
Salaries and Benefits	1,263	1,087	1,136	49	4.5%
Travel	7	7	7	0	0.0%
Total, Other DOE Matrix Support	1,270	1,094	1,143	49	4.5%
FTE's	17	14	14	0	0.0%
Headquarters-OCRWM					
Headquarters					
Salaries and Benefits	8,579	6,605	6,159	-446	-6.8%
Travel	257	240	235	-5	-2.1%
Other Related Expenses	2,679	1,750	1,803	53	3.0%
Support Services	8,014	7,031	7,117	86	1.2%
Total, Headquarters	19,529	15,626	15,314	-313	-2.0%
FTE's	74	65	58	-7	-10.8%
YMSCO - Nevada					
Salaries and Benefits	10,363	11,387	12,265	878	7.7%
Travel	442	438	443	5	1.1%
Other Related Expenses	2,641	2,227	2,333	106	4.8%
Support Services	27,860	27,244	27,822	578	2.1%
Total, YMSCO	41,306	41,296	42,863	1,567	3.8%
FTE's	106	111	117	6	5.4%
Total Program Direction					
Salaries and Benefits	20,580	19,549	20,051	502	2.6%
Travel	706	685	685	0	0.0%
Other Related Expenses	5,320	3,977	4,136	159	4.0%
Support Services	35,874	34,275	34,939	664	1.9%
Total, Program Direction	62,480	58,486	59,811	1,325	2.3%
FTE's	202	196	195	-1	-0.5%

Detailed Program Justification

	(dollars in thousands) FY 1998	FY 1999	FY 2000
Salaries and Benefits			
▪ Provides salaries and benefits for 202 FTE's in FY 1998, 196 FTE's in FY 1999 and 195 FTE's in FY 2000	20,580	19,549	20,051
Travel			
▪ Includes all costs of transportation of persons, subsistence of travelers, and incidental travel expenses in accordance with Federal travel regulations which are directly chargeable to OCRWM	706	685	685
Other Related Expenses			
▪ Includes funding for building maintenance, rents, communications, utilities, computer/video support, printing and graphics, photocopying, postage, supplies and common administrative services.	5,320	3,977	4,136
Support Services			
▪ Includes all costs which are defined as advisory and assistance services acquired by contract from non-governmental services to support or improve the OCRWM organization	35,874	34,275	34,939
Total, Program Direction	62,480	58,486	59,811

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
▪ Increase in salaries and benefits is due to general pay increases, promotions and within-in grade increases	+502
Other Related Expenses	
▪ The 4% increase is due to inflation from the FY1999 level	+159

	FY 2000 vs. FY 1999 ($000)
Support Services	
▪ The Support Services increase is due to the expanded workscope necessitated by the critical review requirements for the following activities and performance measures: Yucca Mountain site compliance with 10 CFR Part 960; the documentation that will support a Secretarial decision on Site Recommendation; review of the Working Draft License Application; and, the development of the Acceptance Draft License Application	+664
Total Funding Change, Program Direction	+1,325

Support Services

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters Support Services					
Technical Support Services					
Quality Assurance	1,195	1,328	1,328	0	0.0%
Management & Technical Services	2,755	1,876	1,876	0	0.0%
Technical Analysis	450	450	270	-180	-40.0%
Subtotal,Technical Support Services	4,400	3,654	3,474	-180	-4.9%
Management Support Services					
Automated Data Processing (ADP)	2,743	2,660	2,926	266	10.0%
Quality Assurance Mgmnt Assessment	344	382	382	0	0.0%
Human Resources Support Services	527	335	335	0	0.0%
Subtotal, Management Support Services	3,614	3,377	3,643	266	7.9%
Total, Headquarters Support Services	8,014	7,031	7,117	86	1.2%
YMSCO Support Services					
Technical Support Services					
Quality Assurance	8,513	8,603	8,603	0	0.0%
Management & Technical Services	9,814	9,165	9,970	805	8.8%
Environmental Impact Statement (EIS)	5,899	6,000	5,583	-417	-7.0%
Subtotal, Technical Support Services	24,226	23,768	24,156	388	1.6%
Management Support Services					
Automated Data Processing (ADP)	2,698	2,508	2,698	190	7.6%
Administrative Support	936	968	968	0	0.0%
Subtotal, Management Support Services	3,634	3,476	3,666	190	5.5%
Total, YMSCO Support Services	27,860	27,244	27,822	578	2.1%
Total, Support Services	35,874	34,275	34,939	664	1.9%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters Other Related Expenses					
Working Capital Fund	2,529	1,600	1,653	53	3.3%
Communications	100	100	100	0	0.0%
Training	50	50	50	0	0.0%
Total, Headquarters Other Related Expenses	2,679	1,750	1,803	53	3.0%
YMSCO Other Related Expenses					
Communications, Rent and Utilities	1,300	1,352	1,406	54	4.0%
Transportation of Things	40	30	30	0	0.0%
Training	75	75	75	0	0.0%
Other Services	1,226	770	822	52	6.8%
Total, YMSCO Other Related Expenses	2,641	2,227	2,333	106	4.8%
Total, Other Related Expenses	5,320	3,977	4,136	159	4.0%

Defense Nuclear Waste Disposal

Defense Nuclear Waste Disposal

Proposed Appropriation Language

For nuclear waste disposal activities to carry out the purposes of Public Law 97-425, as amended, including the acquisition of real property or facility construction or expansion, [$189,000,000] *$112,000,000* to remain available until expended. *Further, for the foregoing purposes, $190,000,000, to become available October 1, 2000 to remain available until expended.*

Explanation of Change

The Budget requests that an additional $39 million be provided from $85 million in unobligated balances remaining from the FY 1996 Defense Nuclear Waste Disposal Appropriation (Public Law 104-46) and transferred to the Nuclear Waste Disposal account in FY 2000.

Defense Nuclear Waste Disposal

Program Mission

The goal of the Defense Nuclear Waste Disposal Program is to dispose of high-level waste generated from atomic energy defense activities. The primary focus of this program is to find a long term geological repository for Defense Nuclear Waste. This effort supports the Yucca Mountain Site Characterization Project and the Waste Acceptance Storage and Transportation (WAST) Project, which are described in detail in the Nuclear Waste Fund Budget Request.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Budget Request	FY 2001 Budget Request
Defense Nuclear Waste Disposal				
Yucca Mountain Site Characterization.....	190,000	189,000	112,000	190,000
Total, Defense Nuclear Waste Disposal.....	190,000	189,000	112,000	190,000

Public Law Authorization:

P.L. 97-425, "Nuclear Waste Policy Act" (1982);

P.L. 100-203, "Nuclear Waste Policy Amendments

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory	2,076	2,558	2,919	361	14.1%
Oakland Operations Office					
Lawrence Berkeley Laboratory	8,781	6,648	5,066	-1,582	-23.8%
Lawrence Livermore National Laboratory	18,766	22,634	21,857	-777	-3.4%
Albuquerque Operations Office					
Sandia National Laboratory	11,306	13,546	11,172	-2,374	-17.5%
Los Alamos National Laboratory	13,166	11,536	10,204	-1,332	-11.5%
Nevada Operations Office a	121,814	118,790	48,217	-70,573	-59.4%
Nevada Test Site	6,452	4,690	4,914	224	4.8%
Nevada (Yucca Mountain Project Office)	6,100	6,580	6,580	0	0.0%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	295	754	292	-462	-61.3%
Richland Operations Office					
Pacific Northwest Laboratory	1,244	1,264	779	-485	-38.4%
Total, Program	190,000	189,000	112,000	-77,000	-40.7%

a Includes Financial Assistance to the State of Nevada, and Affected Units of Local Government and includes funding for contracts administered in Nevada (i.e. Management and Operating Contractor, USGS, National Academy of Science, Universities, etc.)

Site Description

Argonne National Laboratory

In support of Design and Engineering, Argonne National Laboratory conducts waste form testing. The laboratory is also the custodian for new spent fuel approved test material.

Lawrence Berkeley Laboratory

In support of Core Science, Lawrence Berkeley National Laboratory conducts Unsaturated Zone flow and transport modeling, thermal hydrologic modeling activities, geophysics testing, and supports Drift Scale testing. LBNL also performs the seepage tests in the exploratory studies facility alcoves and niches. LBNL supports the abstraction activities needed to conduct the Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Lawrence Livermore National Laboratory

In support of Core Science, Lawrence Livermore National Laboratory conducts experiments and modeling activities needed for the repository design and to predict responses of the engineered and natural barrier systems to the heat generated by radioactive waste. The experiments include the Single Heater and Drift Scale tests in the ESF, the proposed heater tests in the Cross drift, and the Large Block test on the Fran Ridge at the site. In support of Design and Engineering, LLNL conducts testing and modeling of the waste package environment, waste package materials and waste forms. LLNL also supports the abstraction activities needed to conduct Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Sandia National Laboratory

In support of Core Science, Sandia National Laboratories conducts in-situ monitoring in the Exploratory Studies Facility and in the East-West drift, and performance confirmation testing. The laboratory conducts geoengineering and rock mechanics studies, and backfill analyses in support of Design and Engineering. The laboratory also supports Suitability/Licensing and Performance Assessment with performance assessment modeling.

Los Alamos National Laboratory

In support of Core Science, Los Alamos National Laboratory conducts geochemistry, mineralogy, and colloid transport studies. LANL conducts laboratory – and field-scale transport tests, including the Busted Butte Transport Test, and develops radionuclide transport models for the unsaturated and saturated zone groundwaters at the site. LANL corroborates with USGS on isotopic and groundwater chemistry investigations needed for transport models. In support of Operations/Construction, the laboratory coordinates testing at the Yucca Mountain site, including testing in the ESF. LANL also supports the abstraction activities needed to conduct Total System Performance Assessment in support of Site Recommendation and Licensing Application.

Nevada Test Site

In support of Core Science and Operations/ Construction at the Yucca Mountain Site, the Nevada Test Site, through Bechtel Nevada, provides NTS common site support such as: logistics, fire protection, security, emergency medical services, roads/grounds maintenance, environmental operations, vehicle/construction equipment maintenance, facility maintenance, bus transportation, janitorial and refuse services, and power usage.

Nevada Operations Office

In support of the Yucca Mountain Project and the OCRWM Program Direction, the Nevada Operations Office administers disbursement of External Oversight and PETT funds to affected units of government, and also administers contracts/agreements with: TRW Environmental Safety Systems as the OCRWM Management & Operating (M&O) contractor, the United States Geological Survey, the National Academy of Sciences, the University and Community College System of Nevada, Atomic Energy Canada Limited, Jason Technologies Corporation, Alpha Services , Science Applications International Corporation, Bechtel Nevada , and Wackenhut Services, Inc.

Yucca Mountain Project Office in Nevada

The Yucca Mountain Project Office in Nevada has the primary responsibility for the characterization of the Yucca Mountain site, and if the site is suitable, for preparing and submitting a license application to the Nuclear Regulatory Commission for construction of the repository. As the future owner and licensee of the repository, DOE develops and implements policies and strategies for the work to be completed and oversees the management and operating contractor and the United States Geological Society in performing this work. YMSCO manages the contracts for the management and operating contractor and the support services contractors for work at Yucca Mountain.

Site characterization and license preparation activities include developing and conducting surface-based and underground data collection and testing; design of the repository and waste package subsystems; developing and implementing environmental, safety and health policies; preparing the environmental impact statement; interacting with oversight and regulatory groups; and providing the necessary management and site infrastructure to support these activities.

Oak Ridge National Laboratory

In support of Design and Engineering, the Oak Ridge National laboratory provides support in analyzing commercial reactor criticality data, radiochemical assays and uncanistered fuel design. The laboratory also provides technical support for the disposal criticality topical report, thermal/neutronics model and criticality analysis process report.

Pacific Northwest Laboratory

In support of Design and Engineering, the Pacific Northwest Laboratory provides waste form testing support.

Departmental Administration

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The Department of Energy's FY 2000 Congressional budget justification will be available on the CFO homepage at http://www.cfo.doe.gov/budget/00budget/index.htm

Departmental Administration

Proposed Appropriation Language

For salaries and expenses of the Department of Energy necessary for departmental administration in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the hire of passenger motor vehicles and official reception and representation expenses (not to exceed $35,000), [$200,475,000] *$240,377,000*, to remain available until expended, plus such additional amounts as necessary to cover increases in the estimated amount of cost of work for others notwithstanding the provisions of the Anti-Deficiency Act (31 U.S.C. 1511 et seq.): *Provided*, That such increases in cost of work are offset by revenue increases of the same or greater amount, to remain available until expended: *Provided further*, That moneys received by the Department for miscellaneous revenues estimated to total [$136,530,000] $116,887,000 in fiscal year [1999] 2000 may be retained and used for operating expenses within this account, and may remain available until expended, as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of 31 U.S.C. 3302: *Provided further*, That the sum herein appropriated shall be reduced by the amount of miscellaneous revenues received during fiscal year [1999] 2000 so as to result in a final fiscal year [1999] 2000 appropriation from the General Fund estimated at not more than [$63,945,000] $123,490,000. *(Energy and Water Development Appropriation Act, 1999.)*

Departmental Administration

Executive Summary

Support the Departmental Mission

The Departmental Administration Appropriation (DA) funds eleven Department of Energy headquarters offices which provide guidance and support benefitting all operating elements of the Department in such areas as human resources, administration, accounting, budget, legal services, information management systems, life cycle asset management, workforce diversity, policy, congressional liaison, public affairs and contract reform. Their mission is to provide internal and external customers with timely, quality service which facilitates achievement of the Department's goals

Reinventing Government

This account has undergone radical changes during the last five fiscal years; realizing a 32% decline in federal employment from 1,920 (including the Office of the Secretary) in FY 1995 to 1,297 proposed in the FY 2000 budget. At the same time, the Department has implemented initiatives designed to streamline and provide essential products and services in a more efficient manner One example of such an initiative is the effort to consolidate the Department's accounting operations; reducing from nineteen centers scattered across the United States, to three centers of excellence, the largest of which is at DOE headquarters Another example is our effort to consolidate our office space and reduce the number of separate buildings housing DOE headquarters personnel.

Vital Functions Performed

Despite these reductions the Department stands ready to provide essential services to its mission programs, as well as serve the Secretary of Energy and protect taxpayer interests. The following highlights are provided to outline the remaining critical functions and essential services provided by this account. These vital services include:

- Performing strategic planning and implementing management reforms like the Government Performance and Results Act.
- Planning to maximize the value of Departmental assets and revenue from the sale of assets.
- Cooperating with International Energy Consortiums and Interagency review of policies that affect Department of Energy concerns.

- Facilitating communication between the Department and Congress, the Executive Office, State and Local Governments and the public.
- Performing financial and accounting functions including producing audited financial statements.
- Fulfilling the Department's budget mission in terms of timely formulation and oversight of program execution (overhead and uncosted balances)
- Providing effective and timely legal services, counsel, and support to Departmental elements.
- Representing the Department before Federal, State, and other Governmental Agencies and Courts.
- Protect our Intellectual Property associated with patents, invention disclosures, and waiver requests.
- Acting as an honest broker for the Secretary among competing programmatic elements.
- Processing procurement and personnel actions.
- Developing and maintaining Corporate Information Systems and Communication Technology.
- Ensuring the success of the Working Capital Fund by supplying products and services throughout the Department.
- Promoting diversity within the entire Department and throughout the program areas affected by our decisions (including economic impact).

A strong corporate vision helps set the proper priorities to ensure that a program which succeeds in its goals will not fail in its mission. These offices provide a strong internal mechanism to focus program efforts on corporate goals. This is the optimal method of fulfilling our obligations to those who rely on the mission of the Department of Energy.

Program Overview

DOE programs funded in this appropriation are: Office of the Secretary, Policy and International Affairs, Chief Financial Officer, Management and Administration, Congressional and Intergovernmental Affairs, Public Affairs, Field Management, General Counsel, Economic Impact and Diversity, Board of Contract Appeals and Contract Reform and Privitization. Federal support

functions include planning and national and international energy policy analysis, environmental policy, budget, accounting, legal, personnel, labor relations, staffing, organizational management, logistical services, printing, information management, contract management and reform, quality management, personal property management, scientific and technical training, congressional liaison, public and consumer outreach, economic impact and diversity, and contract dispute adjudication Funding includes Departmental Administration employee travel and training, budget and accounting systems, logistical services, automated data processing development and acquisition (non-program specific), equipment maintenance, civil rights, each Departmental Administration sub-program's share of the working capital fund, and capital equipment. Also funds energy and environmental policy studies, public service announcements, newswire services, minority education/business/community support and assistance, and Department-wide technical training development.

Cost of Work for Others

The budget provides for the cost of products and services provided by the field offices and national laboratories for non-DOE users. Work results from revenue programs related to the budgeted mission of DOE or is reimbursable work for state and local entities which are precluded by law from making advance payments Costs are offset with revenues received from the sale of products or services

Revenues

The revenues associated with the Cost of Work for Others program support the products and services described above. Miscellaneous revenues come from the sale of by-products that have no cost associated with the Departmental Administration appropriation, but offset the appropriation.

Budget Overview

The FY 2000 request provides $4.9 million for 40 full time equivalents within the Office of the Secretary, and $3.2 million for seven full time equivalents within the Contract Reform and Privitization Office. This request also provides $112.1 million for related salary and benefit expenses for 1,257 full-time equivalent employees for the other organizations within the Departmental Administration Account. The request includes $3.5 million for travel funding, $71.2 million for contractual support, and $18.6 million for program support. Cost of Work for Others and Revenues are budgeted at $34.0 million and $116.9 million, respectively. There is a FY 2000 Base Request of $13.0 million for the Corporate Information Management Program within program support. In addition, a total of $7.1 million of prior year balances are being utilized in FY 2000 to offset program level for salaries and benefits ($.5 million) and cost of work ($6.6 million). The net appropriation request is $123.5 million

Program Funding Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Office of the Secretary	4,123	5,000	4,940
Personnel Compensation and Benefits	102,695	105,859	112,053
Travel	2,923	2,983	3,465
Other Related Services	70,077	76,485	71,248
Contract Reform	0	3,200	3,200
Program Support	10,490	12,500	18,582
Cost of Work for Others	37,470	44,312	34,027
Subtotal, Dept. Admin. (Gross)	227,778	250,339	247,515
Revenues:			
Associated	-33,279	-46,614	-35,587
Miscellaneous	-57,596	-89,916	-81,300
Subtotal, Revenues	-90,875	-136,530	-116,887
Subtotal, Dept. Admin. (Net)	136,903	113,809	130,628
Use of Prior Year Balances/Other Adjustments	-3,623	-2,237	-7,138
Transfer from Other Defense Activities	0	-37,627	0
Total, Dept. Admin.	133,280	73,945	123,490

Organization Funding Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Office of the Secretary	4,123	5,000	4,940
Management and Administration	104,657	115,450	114,723
Chief Financial Officer	21,662	23,120	23,792
Field Management	7,954	7,500	8,080
Board of Contract Appeals	703	715	838
Congressional and Intergovernmental Affairs	4,337	4,900	4,910
Public Affairs	3,413	3,500	3,963
General Counsel	19,656	19,892	21,434
Office of Policy	17,800	16,350	20,862
Economic Impact & Diversity	6,003	6,400	6,746
Contract Reform	0	3,200	3,200
Cost of Work for Others	37,470	44,312	34,027
Subtotal, Dept. Admin. (Gross)	227,778	250,339	247,515
Revenues:			
Associated	-33,279	-46,614	-35,587
Miscellaneous	-57,596	-89,916	-81,300
Subtotal, Revenues	-90,875	-136,530	-116,887
Subtotal, Dept. Admin. (Net)	136,903	113,809	130,628
Use of Prior Year Balances/Other Adjustments	-3,623	-2,237	-7,138
Transfer from Other Defense Activities	0	-37,627	0
Total, Dept. Admin.	133,280	73,945	123,490

Personnel Compensation and Benefits Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Management and Administration	47,017	47,340	49,100
Chief Financial Officer	14,344	15,830	16,502
Field Management	4,297	4,743	5,182
Board of Contract Appeals	509	520	636
Congressional and Intergovernmental Affairs	3,424	4,031	4,060
Public Affairs	2,325	2,494	2,794
General Counsel	15,802	15,746	16,788
Office of Policy	11,423	11,479	13,000
Economic Impact & Diversity	3,554	3,676	3,991
Use of Prior Year Balances	0	-1,412	-466
Total, Dept. Admin.	102,695	104,447	111,587

Travel Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Management and Administration	1,652	1,700	1,665
Chief Financial Officer	176	176	196
Field Management	255	255	255
Board of Contract Appeals	6	6	6
Congressional and Intergovernmental Affairs	46	60	60
Public Affairs	67	70	84
General Counsel	128	100	83
Office of Policy	507	500	1,000
Economic Impact & Diversity	86	116	116
Total, Dept. Admin.	2,923	2,983	3,465

Support Services Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Management and Administration	19,000	27,000	18,000
Chief Financial Officer	3,555	3,402	3,402
Field Management	1,120	584	725
Board of Contract Appeals	0	0	0
Congressional and Intergovernmental Affairs	0	25	25
Public Affairs	0	0	125
General Counsel	236	496	720
Office of Policy	0	0	0
Economic Impact & Diversity	0	0	0
Total, Dept. Admin.	23,911	31,507	22,997

Other Related Services Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Management and Administration	30,488	30,960	32,508
Chief Financial Officer	3,587	3,712	3,692
Field Management	2,282	1,918	1,918
Board of Contract Appeals	188	189	196
Congressional and Intergovernmental Affairs	827	784	765
Public Affairs	971	936	960
General Counsel	3,490	3,550	3,843
Office of Policy	3,620	2,021	3,430
Economic Impact & Diversity	713	908	939
Total, Dept. Admin.	46,166	44,978	48,251

Program Support Profile

(dollars in thousands)

Sub-Program	FY 1998 Current Appropriation	FY 1999 Program Level	FY 2000 Budget Request
Management and Administration			
Scientific and Technical Training	500	450	450
Corporate Management Systems	6,000	8,000	13,000
Subtotal, Human Resources & Administration	6,500	8,450	13,450
Congressional & Intergovernmental Affairs			
Consumer Affairs	40	0	0
Subtotal, Congressional Affairs	40	0	0
Public Affairs			
Public Affairs	50	0	0
Subtotal, Public Affairs	50	0	0
Office of Policy			
Policy Studies	500	350	1,000
Environmental Policy Studies	1,750	2,000	2,432
Subtotal, Office of Policy	2,250	2,350	3,432
Economic Impact & Diversity			
Minority Economic Impact	1,650	1,700	1,700
Subtotal, Economic Impact & Diversity	1,650	1,700	1,700
Total, Dept. Admin.	10,490	12,500	18,582

Office of the Secretary

Mission Supporting Goals and Objectives

The budget submission for the Office of the Secretary provides the Federal staffing resources and associated costs required to provide overall policy direction for the Department of Energy in fulfilling its mission to foster a secure and reliable energy system that is environmentally and economically sustainable, to be a responsible steward of the Nation's nuclear weapons, to clean up our own facilities, and to support continued United States leadership in science and technology.

Program Goal

Provide leadership to ensure the coordination of the Department of Energy's efforts through:

- *Energy Resources* to promote secure, competitive, and environmentally responsible energy systems that serve the needs of the public.
- *National Security* to maintain the Nation's security, promote international nuclear safety, and reduce the global danger from weapons of mass destruction.
- *Environmental Quality* to aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials and permanently dispose of the Nation's radioactive wastes.
- *Science and Technology* to deliver the scientific understanding and technological innovations that are critical to the success of DOE's mission and the Nation's science base.
- *Corporate Management* to demonstrate organizational excellence in the Department's environment, safety and health practices, communication and trust efforts, and corporate management systems and approaches.

Program Objectives

- Assure adequate and diversified supplies of energy, reduce U.S. vulnerability to disruptions in energy supplies, expand the efficiency and productivity of energy use while limiting environmental impact, and support U.S. energy, environmental and economic interests in global markets.
- Effectively support and maintain a safe, secure, and reliable enduring nuclear weapons stockpile without nuclear testing, replace nuclear testing with a Stockpile Stewardship Program, ensure the vitality of the Department's national security enterprise, reduce nuclear weapons stockpiles and the proliferation threat caused by the potential diversion of nuclear materials, continue leadership in policy support and technology development for international arms control and nonproliferation efforts, and improve international nuclear safety.

- Protect public health and the environment by reducing the environmental, safety, and health risks and threats from DOE facilities and materials, safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development program, and develop the technologies and institutions required for solving domestic and global environmental problems.

- Utilize the unique scientific and technological resources of our laboratories and universities to maintain leadership in basic research, increasingly focus applied research and technology development in support of the Department's other business lines, and maintain world technical leadership through long-term systemic reform of science and mathematics education.

- Demonstrate organizational excellence in our environment, safety and health practices, and build communication and trust by delivering on our commitments to Congress, the Administration, stakeholders and customers.

- Provide a safe and rewarding workplace that is recognized for business excellence, and managerial and scientific creativity.

Performance Measures

The Office of the Secretary, through its leadership of the Department, will continue to advance U.S. energy, environmental, economic, and national security. This office will oversee the Department's strategies, commitments, and performance goals outlined in the Department's Strategic Plan, the Performance Agreement between the Secretary and the President, and the Department's Annual Performance Plan.

Significant Accomplishments

Significant accomplishments for the Department are provided in each DOE Program budget submittal.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change
Salaries and Benefits	3,717	4,194	4,400	206
Travel	400	800	534	-266
Other Related Expenses	6	6	6	0
Total, Program Direction	4,123	5,000[a]	4,940	-60
FTEs	28	37	40	3

[a]The Office of the Secretary plans to use $825,000 of carryover balances to support FY 1999 Operations.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Salary and Benefits provide funding for staff in the Office of the Secretary, Deputy Secretary and the Under Secretary to cover salaries and wages, overtime pay, cash incentive awards, lump sum leave payments, performance awards, and benefit payments. The Office of the Secretary provides leadership and guidance to the Department's programs which contribute to the Nation by providing technical information and a scientific and educational foundation to achieve: efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense. . .	3,717	4,194	4,400
Travel			
The FY 2000 travel request provides funding for the Secretary, Deputy Secretary, Under Secretary, and special assistants to travel both internationally and domestically in support of the Department's missions. Beginning FY 2000, travel costs for the Secretary's security detail will be financed by the Office of Nonproliferation and National Security.	400	800	534
Other Related Expenses			
Other Related Expense provides funding for employee training and development.	6	6	6
Total, Program Direction.	4,123	5,000	4,940

Explanation of Funding Changes FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits associated with the full effect of the FY 1999 pay raise and the partial effect of the FY 2000 pay raise and general pay increases for promotions, within grade increases, and performance awards.	+206
Travel	
■ The travel budget increases slightly to reflect additional travel associated with the Deputy Secretary and the Under Secretary, offset by moving the costs of security related to the Secretary to the Office of Nonproliferation and National Security.	-266
Total Funding Change, Program Direction	-60

Management and Administration

Mission Supporting Goals and Objectives

This budget submission covers the Office of Management and Administration and the Secretary of Energy Advisory Board. The Office of Human Resources and Administration was renamed the office of Management and Administration to reflect more accurately the broad management responsibilities of the office.

The Office of Management and Administration works in partnership with our customers to support the Department of Energy by providing effective corporate management systems and business practices while enhancing the effectiveness and well-being of our employees. We will provide best value, high quality, and timely products and services in the areas of administrative services, human resources and training, information management, corporate performance excellence, procurement assistance, and executive secretariat support.

The Office of the Secretary of Energy Advisory Board administers and coordinates the activities of the Secretary of Energy Advisory Board (SEAB), an external advisory board chartered under the Federal Advisory Committee Act of 1972 (Public Law 92-436). The Board and its subcommittees are the most effective means for the Secretary of Energy to obtain timely, balanced, and independent external advice on issues of national importance related to the missions of the Department of Energy. In FY 1998, five subcommittees conducted open public meeting and reported recommendations to the Board and, in turn, the Secretary of Energy. These subcommittees were: (1) Openness Advisory Panel (ongoing); (2) Laboratory Operations Board (ongoing); (3) Electric System Reliability Task Force (completed in FY 1998); (4) Tennessee Valley Electric System Advisory Committee (completed in FY 1998); and (5) Education Task Force (completed in FY 1999). In addition, the Board plans to establish one or more additional subcommittees in FY 1999.

Program Goal

To continue as a proactive and flexible service team dedicated to helping the Department perform its varied missions more effectively. Working in partnership with our customers, we will strive to continually improve our products and services in ways that support their needs.

Program Objectives

- We will create and maintain efficient corporate management systems that assist the Department of Energy in the accomplishment of its mission.
- We will provide best-value products and services to our customers.
- We will be recognized by our customers as being a Quality organization by emphasizing customer and employee satisfaction, and improved partnerships.

- We will enhance the effectiveness, well being, and satisfaction of MA employees.

Significant Accomplishments and Program Shifts

Taken together, the Offices of Management and Administration and the Secretary of Energy Advisory Board have supported the Department's efforts to reform and modernize corporate management practices in such diverse and high profile areas as the following:

- Downsizing, strategic alignment, and related human resources initiatives;
- Reengineering Headquarters administrative functions through the Working Capital Fund;
- Contract reform and privatization,
- Information technology advances and resolution of the "Year 2000" issues;
- Openness initiative and reduction of the Freedom of Information Act backlog,
- Modernizing DOE systems for document control, personnel functions, and payroll; and
- Productivity advances through rigorous self-assessment practices.

These advances have been sustained, notwithstanding a major downsizing within these offices. From FY 1993 to the present, Federal staffing has been reduced by over 40% -- double the rate of the overall DOE staffing decrease and 50% faster than DOE headquarters. Concurrently, there has been both a major reduction and reconfiguration of budget resources. Overall, including program "customer" funding (now provided primarily through the Working Capital Fund) MA spending in nominal dollars decreased by almost $50 million from FY 1993 through FY 1997, and real dollar purchasing power decreased by nearly 30% in the same period. Due to creation of the Working Capital Fund for FY 1997 and future periods, the proportion of MA contract dollars that derives from customer decisions quadrupled from 14% in FY 1993 to 56% in FY 1997.

Looking ahead, this budget request is consistent with the following drivers:

- The Department's Strategic Plan (and the MA counterpart thereto);
- The Secretary's Performance Agreement with the President;
- The Secretary's "Workforce 21" initiatives;
- The Department's contract reform objectives
- The milestones for Year 2000 changes in mission critical information systems;
- The Department's FY 1999 appropriation and the FY 1999 Performance Plan associated therewith;
- The November 1998 report to the Congress on the Corporate Management Information Program;
- The Secretary's Openness Initiative; and
- Our December 13, 1998 guidance to customers on Working Capital Fund costs.

Performance Measures

Performance measures for Management and Administration and for the Secretary of Energy Advisory Board are linked to the Department of Energy Strategic Plan, to the performance plan called for by the Government Performance Results Act, and to the Secretary's annual performance agreement with the President. Specific performance measures and their links to the FY 1999 Performance Agreement with the President follow.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Use efficient and effective corporate management systems and approaches.	Provided best value, high quality and timely Management and Administration products and services and increased customer satisfaction levels by 5% over the pervious year survey results.	Provide best value, high quality and timely Management and Administration products and services so as to sustain a customer satisfaction level of 90%.	Provide best value, high quality and timely Management and Administration products and services so as to sustain a customer satisfaction level of 90%.
Continue to streamline and improve operations, further reduce overhead expenditures, and facilitate additional workforce reductions while aiding affected employees and communities.	Consolidated Headquarters personnel into six locations by the end of FY 1998 and achieved $3 83 million in savings in rent as forecasted.		
	Achieved staffing level of 10,355 in FY 1998 which was 519 below the end-of-year target of 10,874.	Achieve staffing reduction to meet Departmental target of 10,613 by the end of FY 1999.	Achieve staffing reduction to meet Departmental target of 10,269 by the end of FY 2000.
Improving Human Resource Practices	Established two training centers of excellence and realized $3.1 million in savings.	Improve workforce skills and reduce training costs by implementing the FY 1999 milestones in the DOE Corporate Education, Training, and Development Business Plan.	Improve workforce skills and reduce training costs by implementing the FY 2000 milestones in the DOE Corporate Education, Training, and Development Business Plan.
Improving Human Resource Practices.	Hired 40 welfare to work recipients through the end of FY1998.	Continue hiring welfare to work recipients to achieve the Presidential goal of 55, 40 of whom will be hired by the end of FY 1999.	Continue hiring welfare to work recipients to achieve the Presidential goal of 55 by FY 2000
Ensure that DOE employees are appropriately trained and technically competent commensurate with their ES&H responsibilities	Met the Technical Qualifications Standards requirements and issued a revised Implementation plan for DNFSB Recommendation 93-3.	Improve Federal technical workforce capabilities at defense sites by implementing the FY 1999 milestones of the Revised Implementation Plan for DNFSB Recommendation 93-3.	Improve Federal technical workforce capabilities at defense sites by implementing the FY 2000 milestones of the Revised Implementation Plan for DNFSB Recommendation 93-3.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Improving Human Resource Practices	Implement a DOE-wide employee-accessible automated personnel system by December 1998.	Implement a DOE-wide employee-accessible automated personnel system by December 1998.	Increase the electronic transfer of personnel documents through implementation of paperless workflow in CHRIS, reducing personnel paper transactions by 15%.
		Reengineer the DOE awards process for Headquarters On-the-Spot and Special Act awards, and reengineer the Training Administration function.	
Ensuring DOE information systems are based on cost-effective technology solutions	Implemented a five-year information management strategic plan and annual operational plans linked to the budget process.	Develop annual operational Information Management plan linked to the budget process.	Develop annual operational Information Management plan linked to the budget process
	Initiated a Configuration Control Board pilot in Defense Programs.	Continue to improve infrastructure to allow accessing and sharing information easily and seamlessly across the DOE complex.	Continue to improve infrastructure to allow accessing and sharing information easily and seamlessly across the DOE complex.
	Exceeded the Departmental goal by increasing the number of DOE organizations that rely on the Paperless Directives System to 89%.		
	Completed an acceleration plan for all mission-critical systems to achieve Year 2000 compliance by March, 1999.	Implement all FY 1999 milestones for year 2000 changes for mission-essential systems	
Ensuring DOE information systems are based on cost-effective technology solutions.	Completed Corporate Management Information Program (CMIP) report to Congress March 1998.	Develop the Corporate Management Information Program (CMIP) reports to Congress.	Develop the Corporate Management Information Program (CMIP) reports to Congress.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Continue to streamline and improve operations, further reduce overhead expenditures, and facilitate additional workforce reductions while aiding affected employees and communities	Achieved $61 million in information technology cost avoidances over five years through improved technology	Achieve $65 million in further cost avoidances in information architecture and large scale procurements Continuously evolve the Department-wide information architecture with supporting standards to foster $100 million in cost avoidances by FY 2003.	Achieve $58 million in further cost avoidance through improved information technology
Improving communications with customers and public.	Significantly improved the World Wide Web Home Pages and totally revamped the DOE Home Page. Visits increased by nearly 40%.	Improve the quality and volume of information on DOE's World Wide Web site and demonstrate user-interest through higher numbers of home page visits each year	Annually improve the quality and volume of information on DOE's World Wide Web site and demonstrate user-interest through higher numbers of home page visits each year. Continue to enhance information security throughout the Department to minimize vulnerabilities and protect the nation's infrastructure.
Use prudent contracting and business management practices.	Major management contracts were converted to performance-based management contracts as extended or competed consistent with objectives. Service contracts converted to performance based contracts consistent with schedule. Automated system to track and measure contractor performance completed and deployed.	Develop fully integrated program of performance objectives and measures for major management contracts consistent with DOE performance based management concepts. 100% of the Department's M&O/M&I contracts will conform to the DOE Contract Reform objectives	
		Converting all management and operating contracts awarded in FY 1999 to performance-based management contracts.	Converting all management and operating contracts awarded in FY 2000 to performance-based management contracts.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Use prudent contracting and business management practices.	Comprehensive review of Department of Energy Acquisition Regulations for management and operating contracts completed. Agenda for FY 1999 modifications completed.	Modify Department of Energy Acquisition Regulations to comport with the results of the review Award 50 percent of all management and operating contracts including 3 M&O contracts that will change to Federal Acquisition Regulation contracts during FY 1999 using competitive procedures.	
	Contracting workforce development program completed.	Expand professional development and certification programs to acquisition-associated professional fields.	95% of contract professionals will be certified under DOE professional development standards.
	Cycle times for priority procurement process reduced by 30 - 60%. Target met or exceeded	Develop and install electronic procurement systems for paperless procurement action processing, web-enabled past performance database, and electronic commerce system for purchases under $25,000	Maintain and operate electronic procurement systems installed through FY 1999 to accomplish the following: ■ industry interactive procurement processes; ■ electronic procurement system for purchases under $25,000; and ■ paperless procurement action processing system.
		Award 50% of all service contracts in FY 1999 as performance-based contracts.	Award approximately 50% of service contracts as performance-based contracts.
Continue to streamline and improve operations, further reduce overhead expenditures, and facilitate additional workforce reductions while aiding affected employees and communities.	Technical and support service contract obligations reduction target of $610 million exceeded by 20%	Reduce support service contracting obligations below $610 million in FY 1999.	Reduce support service contracting obligations below $610 million in FY 2000.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Use efficient and effective corporate management systems and approaches	Implemented DOCS in the Executive Secretariat and one-stop in all program offices. Baselined executive document management cycle-time and responded to customer feedback. Improved customer satisfaction rate for executive document management by 5%.	Implement DOCS to two or more levels in several program offices Monitor executive document management cycle-time, reduce cycle-time by 5% and sustain or improve customer satisfaction rate for executive document management	Continue implementing DOCS to two or more levels in several program offices. Continue monitoring executive document management cycle-time and customer satisfaction to sustain or improve customer satisfaction with executive document management.
	Continued use of DOECAST for Secretary of Energy communication to employees and improved customer satisfaction by 5% based on MA customer survey	Continue high-speed, low cost DOE-wide communication using DOECAST system, measured by estimated cost avoidance and a sustained level of customer satisfaction.	Continue high-speed, low cost DOE-wide communication using DOECAST system, measured by estimated cost avoidance and a sustained level of customer satisfaction.
Improving communications with customers and public	Established electronic FOIA (EFOIA) requirements and implemented EFOIA homepage site that includes on-line access to reading room material, and other DOE records. Published Privacy Act system notice to delete obsolete systems of records. Added two program offices to the centralized requests processing project Reduced backlog of pending requests by 15% and average case age by 15%	Fully implement EFOIA. Reduce backlog of pending requests by 10% and average case age by 15%.	Fully automate FOIA program using corporate solution approach. Continue to reduce backlog by 10% and average case age by 10%.
Improving Managerial Performance and Accountability	Using the Malcolm Baldrige, President's, or Energy Quality Award Criteria, demonstrated continuous organizational improvement by improved self-assessment scores.	Use the Malcolm Baldrige, President's, or Energy Performance Excellence Award Criteria to measure customer satisfaction, employee satisfaction, and the achievement of business results.	Use the Malcolm Baldrige, President's, or Energy Performance Excellence Award Criteria to measure customer satisfaction, employee satisfaction, and the achievement of business results

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Secretary of Energy Advisory Board			
Improving the management of the laboratories to enhance the delivery of leading-edge science and technology at reduced costs	Continued to assess ways of improving R&D management, reducing R&D management costs, and reducing R&D overhead costs by Completed a study of the missions and effectiveness of the Department's small laboratories and reporting to SEAB; Completed a study of peer review as a means of ensuring excellence in R&D and reporting to SEAB; Updated and analyzed information on laboratory productivity metrics and reporting to SEAB; and Supported the Department's "road map" planning efforts involving program offices and laboratories.	Conduct a review and assessment of the linkage between the Department's missions and programs. Conduct a review and analysis of the Department's planning and management processes and their links to the R&D portfolio. Conduct a review of laboratory performance measures and their appropriateness to laboratory R&D Conduct a review and analyze the effectiveness of contractual and field oversight	Track implementation of recommendations resulting from FY 1999 activities. Identify further refinements to improve cost effectiveness and enhance the contributions of the laboratory system to the Department's missions.
As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner	Continued to address classification/declassification policy and openness issues by reporting to SEAB on: Assessing document imaging technology to expedite document declassifications; Assessing the use of technology to address key records management issues impacting openness; and Assessing the Department's implementation of the Fundamental Classification Policy Review. Reviewed site-accessibility issues.	Engage representatives from communities in which the Department has facilities in a series of discussions of the Department's role as a neighbor. Report to the Secretary on the status of relations with these communities. Continue to oversee the implementation of openness and classification and declassification policies and procedures by Review and analysis of ways to utilize technology to improve the outputs of declassification and the accessibility of records; and Review and assessment of the Department's implementation of the Fundamental Classification Policy Review and Final Rule (10 CFR 1045 § 1046.6)	Engage representatives from communities in which the Department has facilities in a series of discussions of the Department's role as a neighbor. Report to the Secretary on the status of relations with these communities. Continue to oversee the implementation of openness and classification and declassification policies and procedures.

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.	Continued to address institutional, technical, and policy issues and contribute to electric system restructuring legislation by developing letter reports on: Technical issues in transmission system reliability; Interrelationships between industry, state, and Federal reliability organizations; Reliability enforcement authorities; Adequacy of generation and support services; Financial incentives for reliability. To be completed in FY 1998.		
Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact.	The Tennessee Valley Electric System Advisory Committee will address the following major topics regarding the Tennessee Valley Authority in their final report: Regulation and Jurisdiction; Mission; Competition. To be completed in FY 1998.		
Ensure the vitality of DOE's national security enterprise by ensuring sufficient scientific and technical personnel.	The Task Force on Education was formed in FY 1998 to advise SEAB on ways to make the Department's scientific, technical and supercomputing capabilities more available to our Nation's schools, colleges and universities, and to provide recommendations on how the Department can best enhance science, technology, engineering and mathematics education in the United States.	Complete the task force final report and submit final recommendations to the SEAB. To be completed in FY 1999.	

External Performance Measures/Accomplishments			
	FY 1998	FY 1999	FY 2000
Deliver leading-edge technologies that are critical to the DOE mission and the nation.		Initiate one of two new Task Forces to assess the key policy and institutional issues critical to the Department's missions, to include: A task Force to review fusion energy technologies, both inertial and magnetic, to assess the appropriate balance among these concepts to provide the scientific basis for an informed selection of the best option for development To be completed in FY 1999	Initiate one of two new Task Forces to assess key policy and institutional issues critical to the Department's missions

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	47,017	47,340	49,100	1,760	3.7%
Travel	1,652	1,700	1,665	-35	-2.1%
Support Services	19,000	27,000*	18,000	-9,000	5.9%
Other Related Services	30,488	30,960	32,508	1,548	5.0%
Total, Program Direction	98,157	107,000	101,273	-5,727	-5.4%
Full Time Equivalents	607	598	592	-6	-1.0%

* Includes $10,000,000 in accordance with P.L. 105-277 for emergency expenses related to Year 2000 conversion of federal information technology systems.

Detailed Program Justification

	(dollars in thousands)		
	FY1998	FY1999	FY2000
Salaries and Benefits			
Provides funding in FY 2000 for 592 full time equivalent employees to include salaries, overtime, incentive awards, lump sum leave, SES and other performance awards, payments on behalf of employees for payments to funds such as workman's compensation..	47,017	47,340	49,100
Travel			
Travel funds finance staff travel, Secretary of Energy Advisory Board and subcommittee travel, travel associated with scheduling and logistics for Secretarial trips, and travel associated with permanent change of station. Also included are DOE shuttle bus service, rental of vehicles from the GSA motor pool, lease of DOE fleet, and charter of aircraft or buses.	1,652	1,700	1,665
Support Services			
Support Services finance technical support services and management support services. The areas of support include information resources management, automated data processing, delivery of training, operation of the Headquarters technical and law libraries, database maintenance, and administrative support. Includes $10,000,000 only in FY 1999 for Y-2K efforts.	19,000	27,000	18,000
Other Related Expenses			
Other Related Expenses finance the acquisition of goods and services that support this office's mission that are not considered support services, in addition to items purchased from the working capital fund such as rent, supplies, telephone service, etc.	30,488	30,960	32,508
Total, Program Direction	98,157	107,000	101,273

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ The increase of $1,760,000 primarily reflects the full effect of the FY 1999 pay raise and the partial effect of the FY 2000 pay raise ($1,425,000), plus the full effect in FY 2000 of promotions from FY 1999 plus anticipated promotions in FY 2000 ($335,000)..	+1,760
Travel	
■ Decrease in travel is due to increased in use of alternatives like teleconferencing.	-35
Support Services	
■ Decrease in Support Services is due to a decrease of $10,000,000 appropriated in Public Law 105-277 for Y-2K activities offset by a $1,000,000 increase in activities to improve the Department's infrastructure to accommodate new and upgraded management systems.	-9,000
Other Related Expenses	
■ Increase in Other Related Expenses is for interagency agreements, and computer software and hardware upgrades and replacements.	+1,548
Total Funding Change, Program Direction	-5,727

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Training/Curriculum Development	1,133	275	275	0	0%
Information Management Support	14,867	23,725	14,725	-9,000	-37.9%
Other Administrative Support	3,000	3,000	3,000	0	0%
Total, Support Services	19,000	27,000	18,000	-9,000	-33.3%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	20,000	20,000	20,000	0	0%
Capital Equipment	1,430	1,430	1,430	0	0%
Other	9,075	9,530	11,078	1,548	16.2%
Total, Other Related Expenses	30,505	30,960	32,508	1,548	5.0%

Management and Administration Program Support

Program Mission

Program Support includes funding for the Scientific and Technical Training Program and the Corporate Management Information Program (CMIP).

The Scientific and Technical Training Program provides DOE-wide training standards and guidelines, and advanced learning technologies, such as automated course catalogues, video and computer training methods, and distance learning Includes funding for coordination and assessment of the implementation of Defense Nuclear Facilities Safety Board training, education, and development recommendations

CMIP, a seven-year, $102 million investment initiative to replace major outdated DOE corporate systems provides a disciplined and cost-effective way to modernize a wide range of DOE business systems in a coordinated manner that reflects use of emerging technologies.

Program Goal

We will create and maintain efficient corporate management systems that assist the Department of Energy in the accomplishment of its mission.

Program Objectives

This program was first funded in FY 1998 and includes the following major corporate initiatives which will continue over the next six years at a planning level of $102 million:

- Corporate Human Resources Information System (CHRIS);
- Corporate Business Management Information System-Financial Management (BMIS);
- Corporate Technology Supported Learning;
- Procurement Systems Modernization,
- Information Architecture, Capital Planning and Investment, and Strategic Information Management; and
- Infrastructure and Telecommunications Improvements.

Funding Schedule

(dollars in thousands)

Program Support	FY 1998	FY 1999	FY 2000	$ Change	% Change
Scientific and Technical Training	500	450	450	0	0.0%
Corporate Management Information	6,000	8,000	13,000	5,000	62.5%
Total, Management and Administration	6,500	8,450	13,450	5,000	59.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Scientific and Technical Training			
Implement the FY 2000 milestones of the Revised Implementation Plan for DNFSB Recommendation 93-3; provide DOE-wide training standards and guidelines, advanced learning technologies and continued support for the Federal Technical Capability Program.	500	450	450
Total, Scientific and Technical Training	500	450	450

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Corporate Management Information Program

- **Corporate Human Resources Information System (CHRIS)**
  - Maintain CHRIS in a full production environment for personnel action processing as official personnel system of record.
  - Support the re-engineering of additional human resource services at Headquarters and in the field.
  - Implement additional human resource functions to meet identified needs of stakeholders and customers to assist them in the efficient conduct of their business.
  - Successfully upgrade PeopleSoft HRMS from release 7.0 to release 8.0 (two release upgrade) to ready the system for integrated testing of HRMS and Payroll/Time and Labor.
  - Expand DOE Employee Self-Service to provide additional information and services to employees and managers at the desktop.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- **Corporate Business Management Information System-Financial Management (BMIS)**
  - Purchase of commercial off-the-shelf core financial system software, minimal implementation and integration services, and training sufficient to support two pilot sites.
  - Acquisition and installation of the hardware and utility software required to support the pilot project.
  - Expansion of the Financial Data Warehouse and the Corporate Executive Information System which will serve as the principal reporting tools for the new system.
- **Corporate Technology Supported Learning (TSL)**
  - A comprehensive assessment of TSL training needs.
  - Infrastructure analysis and design.
  - Purchase and installation of hardware, equipment and net server software.
  - Purchase of network services.
  - conducting system tests.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- **Procurement Systems Modernization**
  - Industry Interactive Procurement Process involves the electronic issuance of requests for proposals to offerors, offeror submission of proposals, electronic distribution and evaluation of those proposals, and interactive communication with offerors during the negotiation process
    - Complete testing at Headquarters, including testing with volunteer companies.
    - Registration of companies within the system.
    - Training of Federal personnel Department-wide
    - Development of DOE wide requirements.
    - Programming changes to meet DOE wide requirements.
    - Installation and testing a selected field offices.
    - Roll out to major procurement offices.
  - Electronic Procurement System for purchases under $25,000 - this integrated, Web-based operational electronic simplified acquisition system allows users to request to purchase goods, secure supervisory approvals, commit funds, issue solicitations and /or orders to vendors, and approve invoices for payment.
    - Continue to roll out system to DOE procurement offices and Headquarters staff offices, which involves system set up and training of Federal personnel.
    - Operate the system Department wide, involving maintenance of the DOE gateway and hub through which all communications travel, and continual vendor registration in system.
    - Modify the system as users identify enhancements needed.
    - Complete the programming, testing and implementation of the invoice approval process.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Paperless procurement action processing system involves the electronic creation of a procurement request, for actions over $25,000, by a program office, routing for approvals, securing funding commitments, and transmitting the procurement request to the procurement office.			
– Complete development, testing and implementation at Headquarters with EE.			
– Identify and train other Headquarters offices and install and test system with those offices.			
– Maintain and operate the system.			
– Develop DOE wide requirements.			
– Programming changes to meet DOE wide requirements.			
– Installation and testing at selected field offices.			
– Roll out to field offices.			
■ **Information Architecture, Capital Planning and Investment and Strategic Information Management**			
▸ Conduct cross program/site architectural analysis and updates to the Departmental Information Architecture.			
▸ Continue implementation of the Departmental Capital Planning and Information Technology Investment process at a slow pace.			
▸ Conduct one Strategic Information Management process.			
■ **Infrastructure and Telecommunications Improvements**			
▸ Continue network upgrades and work on priority projects to bring our telecommunications infrastructure up to required level complex-wide and strengthen the security of this critical component of the infrastructure.			
Total, Corporate Management Information Program	6,000	8,000	13,000
Total, Management and Administration	6,500	8,450	13,450

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Corporate Management Information Program	
■ Increase in Corporate Management Information Program is due to contractual requirements for the on-going development of the Business Management Information System	+5,000
Total Funding Change, Management and Administration	+5,000

Chief Financial Officer

Mission Supporting Goals and Objectives

Mission Statement: ***The mission of the Department of Energy's financial management community is to administer the Department's financial operations and to ensure their integrity.***

Functional Responsibilities

The Office of Chief Financial Officer (CFO) provides centralized direction and oversight of the full range of financial activities including: responsibility for the Department's budget formulation, presentation and execution; Department-wide oversight of the requirements of the Federal Managers' Financial Integrity Act (FMFIA); Departmental accounting and financial policies, procedures and directives; operation and maintenance of the Department's payroll system and financial information system/Standard General Ledger; and, performance of financial management functions (accounting, cash management, and reporting). In addition to these Department-wide responsibilities for Headquarters offices, the CFO performs selected financial management functions for field locations; provides oversight of financial operations for the Naval Petroleum Reserves in California and Wyoming; and acts as an Accounting Service Center for six DOE offices. The CFO is also responsible for financial performance based oversight activities within the Department. In all, this office supports the financial needs of a $17 billion enterprise with 16,800 federal employees and 105,000 contractor employees.

Strategic Plan

The CFO Strategic Plan presents a vision of the Department of Energy as a leader in the field of financial management, ranked among the best in government and industry and committed to enhancing its quality. The financial management community needs to be an integral part of the Department's decision making process. Our Strategic Plan is an attempt to develop a long-term perspective that aligns the financial management program with the Department's program missions as partners in a constantly changing environment. To make this vision a reality, the CFO is focusing on five major thrust areas: **Financial Stewardship, Full Partnership, Customer Orientation, Human Resource Management, and Technology/Information Architecture.** CFO Strategic Plan supports the Department's strategic goals as promulgated in the Department's Mission Statement and Strategic Plan. The Core Values of the Department are reflected in our goals and objectives. Sound financial management is essential to accomplishing the Department's goals.

Critical Items/ Success Factors

CFO efforts to improve financial management at the Department support the Secretary's business line goal for Corporate Management: organizational excellence in corporate management systems and approaches. CFO activities ensure the Congress, the Administration, and by extension the American Taxpayer, that the Department is pursuing program goals while maintaining financial stewardship of their funds.

Financial management at the Department operates in an environment of Government-wide efforts to improve financial management and implements legislative and administrative provisions which stress the need for change. CFO performance in producing Audited Financial Statements, performance based budgets (GPRA), and the Corporate Executive Information System maintains our record of sound financial management. Equally important are efforts to implement a paperless travel process and expand electronic funds transfers, efforts to consolidate accounting centers, par.icipation in Business Management Oversight Process (BMOP) headquarters oversight of field operations, and the Department's efforts to control and manage uncosted balances, construction project balances, and functional support costs. The CFO is making meaningful progress in upgrading and modernizing our financial systems with a view toward outsourcing services and purchasing commercial off the shelf (COTS) software where practical.

As a Result of CFO Efforts

Efforts during FY 2000 will result in the continued production of credible financial reports, performance based budgets, improved budget presentations, heightened responsiveness to the OMB and Congress, and better communication with stakeholders. Accounting initiatives will increase efficiency while sustaining timely payments. Information Management efforts will result in modernizing our business management systems, timely reporting, data integrity and improved decision-making tools. Human Resource initiatives will ensure equal opportunity, improve human relations, develop financial management professionals, and expand opportunities for CFO staff. We expect to expand our awareness of customer needs through customer service training, a revised customer service plan, and customer satisfaction surveys.

In addition to these important initiatives, the CFO provides financial services and products essential to sound financial management at the Department. Budget review, funds control, and budget execution are examples of financial services. Other financial services include: program liaison, financial policy and budget consultations, travel and payroll services, and financial systems operations and maintenance. Financial products include: budget requests, reprogramming requests, financial reporting, and analyses. A majority of CFO resources are committed to producing these ongoing financial products and services.

Corporate Financial Systems

Funding for the next generation Business Management Information System (BMIS), which includes the Corporate Executive Information System (EIS) and Financial Data Warehouse (FDW), is sought as part of the Corporate Management Information Program (CMIP) in the Office of Management and Administration, Chief Information Officer, program support request within the Departmental Administration budget request. This activity will be performed under the direction of CFO systems managers. The EIS and FDW will provide an effective means of capturing and integrating data and making business information available to executives, managers, and staff to support the decision making process and achieve the goals put forward in GPRA. The FY 2000 accomplishments will include: acquisition of COTS accounting software, hardware, programming to meet statutory and regulatory requirements, minimum interfaces to other systems, training, and other costs necessary for the pilot implementation. While these funds are not part of this justification, they will be managed by the CFO and are critical to financial management at the Department.

Performance Measures

- Submit an Accountability Report by March 1, 2000 which combines the FMFIA Report, and the CFOs Act Annual Report (including audited financial statements for FY 1999 performance) with other reports required by the Inspector General Act and the GPRA which will result in a more streamlined and consistent Departmental Report.
- Expand the use of Intranet and Internet websites to reduce the requirements for paper reports, approval signatures, leave and earnings statements and facilitate paperless financial processes and increasing customer access by 25%.
- Expand the development and use of web-based applications by 20% to facilitate standardized access for data entry and reporting capabilities.
- Analyze the costs and benefits to the Department of outsourcing payroll operations including payroll systems operations and maintenance completed by September 2000.
- Obtain Treasury's approval through the Department's General Counsel to close out petroleum price violation receivables pursuant to Section 2B of Emergency Petroleum Allocation Act of 1973, where possible, by September 2000.
- Submit a performance based budget to Congress on time and with adequate support.
- When providing the Congressional budget and supporting documents to stakeholders and the public, increase the use and timeliness of materials available as electronic media, computer compact disk, or on the Internet.
- Improve linkage between the goals of the Department's strategic plan, annual performance plan, and resources requested in the budget. This will reduce the time necessary to analyze the impact of changes to funding or, alternately, changes in strategic policy.
- Maintain a 95% prompt payment percentage and make 95% of commercial payments by way of Electronic Funds Transfer for FY 2000, meeting the targeted goal for the Department.
- Conduct two business management oversight reviews of Field Office financial activities.
- Maintain and reduce uncosted balances as a percent of total available to cost.
- Maintain and reduce unobligated balances as a percent of total obligational authority.
- Maintain and reduce functional support costs as a percent of total costs.
- Ensure that no IG or GAO audit recommendations remain open more than one year without a management decision.
- Continue efforts to identify information requirements for the Executive Information System and implement a minimum of two new business areas in FY 2000.
- Continue efforts to expand the data captured and stored in the Financial Data Warehouse and increase the user base by 20%.
- Implement the Business Management Information System (BMIS) to replace our core accounting system on a pilot basis at one accounting service center and two satellite sites to test software functionality and interfaces with other Departmental systems.

- Standardize accounting among the three finance service centers by September 2000, facilitating any future decision to further consolidate functions or service centers for the Department. This effort is performed in concert with process improvement efforts related to the BMIS project.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salaries and Benefits	14,344	15,830	16,502	+672	+4.2%
Travel	176	190	196	+ 6	+3.2%
Support Services	3,555	3,555	3,555	0	0%
Other Related Expenses ..	3,587	3,545	3,539	-6	-0.2%
Subtotal, Program Direction ..	21,662	23,120	23,792	+672	+2.9%
Use of Prior Year Balances		-770[a]	-466[b]	+304	+39.5%
Total Program Direction	21,662	22,350	23,326	+976	+5.1%
Full-Time Equivalents	199	208	208	0	0%

[a]The Chief Financial Officer plans to use $770,000 of carryover balances to fully fund a staffing level of 208 FTEs.

[b]The Chief Financial Officer plans to use $466,000 of carryover balances to offset FY 2000 program requirements.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Provides funding in FY 2000 for 208 full-time-equivalent employees to include salaries, overtime, incentive awards, lump sum leave, SES and other performance awards, payments on behalf of employees, payments to funds such as unemployment compensation and buyouts. CFO staff serves many customers in a wide range of products and services. Within the Department we provide customers with financial services ranging from travel and payroll services for employees to financial reporting for program evaluation. We prepare and execute the Department's budget and interpret and enforce the Department's financial policies. Outside of the Department we serve other federal agencies including the General Accounting Office, Treasury, and Office of Management and Budget. The CFO represents the Department's financial interests with Congress and responds to significant financial legislation beginning with the CFO Act of 1990. Overall the CFO contributes a financial perspective to Departmental decision making	14,344	15,830	16,502
Travel			
Funds staff travel for Department-wide and CFO activities including travel associated with the Department's initiatives related to a new core accounting system, a new payroll system, oversight activities, and budget validation studies.	176	190	196

	FY 1998	FY 1999	FY 2000
Support Services			
Funds financial system operations, maintenance and development and minimal financial technical support . .	3,555	3,555	3,555

	FY 1998	FY 1999	FY 2000
Technical Support			
Budget and Program Liaison Support	377	377	377
Accounting Handbook and Actuarial Support	100	100	100
Subtotal, non ADP Support	477	477	477
ADP Support			
Financial management systems (DISCAS, (MARS, FIS)	949	700	700
Maintenance and Enhancement of budget systems	799	300	300
Mainframe/LAN support . . .	1,160	1,250	1,250
Small Department-wide management systems	115	828	828
Support for data entry, validation, and report generation	55	0	0
Subtotal, ADP	3,078	3,078	3,078
Total, Support Services	3,555	3,555	3,555

	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Funds training, and items purchased from the working capital fund, for example, rent, telephones, and supplies and computer purchases not considered support services	3,587	3,545	3,539

	FY 1998	FY 1999	FY 2000
Training	127	121	134
Working Capital Fund	2,428	2,293	2,405
Payroll Initiatives	323	0	0
Other	286	239	108
Subtotal, non ADP	3,164	2,653	2,647
ADP Support			
Mainframe/LAN Hardware/Software	459	479	479
Software Maintenance	288	358	358
Timeshare	126	55	55
Total, ADP	873	892	892
Subtotal, Other Related Expenses	4,037	3,545	3,539
Use of Prior-Year Balances[c]	450	0	0
Total, Other Related Expenses	3,587	3,545	3,539

Use of Prior-year balances	0	-770	-466
Total, Program Direction	21,662	22,350	23,326

[c] Uncosted balances used to finance FY 1998 ADP activity.

Explanation of Funding Changes FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ The increase of $672 k in personnel compensation and benefits primarily reflects an increase due to a cost of living adjustment and base pay adjustment due to the partial effects of the FY 1999 and FY 2000 pay raises..	+ 672
General Management	
■ General Management: Travel requirements increase $6 k due to CFO initiative to challenge budget estimates and implementation of new corporate systems for accounting and payroll. Training increases by $13 k due to implementation of new corporate financial and payroll systems. The WCF increases $112 k offset by a decrease in Other (eliminate HHS agreement with a new Treasury ASAP system) of -$131 k. Inflation is offset by other contractual efficiencies.	0
Total Funding Change, Program Direction	+ 672

Field Management

Mission Supporting Goals and Objectives

The Office of Field Management is responsible for the managerial oversight of the Department's eight Operations Offices and two Field Offices and provides specialized technical support to enhance the stewardship of the Department's facilities, major projects, and infrastructure. As a corporate integrator, Field Management's role is to foster communications that strengthen the Headquarters/Field relationship, establish consistent approaches that cut across programmatic lines, create practical business management solutions for operational issues within the Department, and advocate continuous improvement techniques. The Federal Staff and related costs associated with fulfilling Field Management's responsibilities are funded by program direction resources.

Significant Accomplishments

- In January 1998, DOE executed the first Contract for Sale covering an entire site - Mound. This action sets the pace for similar innovative sale and lease transactions which respond to the marketplace, encourage economic development, and ultimately reduce the Department's landlord costs. Innovation and inventiveness are now key to a successful real estate program in FY 1998 and beyond.
- Starting in FY 1998, deferred maintenance and maintenance data will be captured in the Facility Information Management System, the Department's corporate real property and facility database. An excess facility designator feature will also be added This will enable the Department, for the first time, to analyze its facility maintenance expenditures on a building-by-building basis and thus help identify areas to reduce landlord costs.
- Deferred maintenance costs will be reflected in the Department's FY 1998 audited Financial Statements. In support of this effort, maintenance management systems are being evaluated.
- Field Management's technical expertise in utility management continues to contribute to significant cost reductions for field and program elements averaging about $19 million a year. For example, a consolidation program for natural gas reduced costs by about $9 million annually, contract negotiations reduced Savannah River electric costs by $18 million a year and saved $3.5 million at the Oakland Operations Office.
- Estimated savings and costs avoidance were identified based on value management studies of project acquisitions. Once implemented, the savings realized over the next ten years would be approximately $97.2 million.
- Integrating systems engineering methods to improve baseline qualities at 13 DOE sites helped Environmental Management identify estimated savings of $2 billion over ten years.
- Field Management established the Departmental policy that will ensure retention of Facility Representative technical competence during staffing realignments. The Facility Representative Retention Guidance was also issued. This fulfills a DOE Commitment as part of the Defense

Nuclear Facility Safety Board (DNFSB) Recommendation 93-3 Implementation Plan and will maintain day-to-day operational safety at contractor-operated DOE facilities is insured.

- The Lessons Learned INTERNET Homepage was revitalized and an INTERNET Homepage providing information about the Department's Society for Effective Lessons Learned Sharing (SELLS) was established. In addition, the SELLS executive committee was reorganized to improve the operational effectiveness of the organization.
- Under the Business Management Oversight process, an expanded pilot study of headquarters oversight over the federal activities at ten field offices was completed in FY 1998. The next step is to proceed with Department-wide implementation. The estimated annual cost savings is $280,000.
- Field Management established the Departmental policy that will ensure retention of Facility Representative technical competence during staffing realignments. The Facility Representative Retention Guidance was also issued. This fulfills a DOE Commitment as part of the Defense Nuclear Facility Safety Board (DNFSB) Recommendation 93-3 Implementation Plan and will maintain day-to-day operational safety at contractor-operated DOE facilities is insured.
- The project management training course, designed to enhance the knowledge, skills and abilities of the Department's field employees was conducted in FY 1998. The course development was completed in FY 1997 and is designed for those field managers that are responsible for assessing and controlling project risks that impact scope, schedule, and cost baselines.
- A plan to implement the congressionally mandated independent reviews of the Department's project management process was established. This effort was coordinated with the Department's business line programs, the Field, OMB, and Congress.

Performance Measures

- Complete the independent project management reviews and forward the applicable reports and Departmental position papers to Congress.
- Verify progress against establish project scope, schedule, and cost baseline objectives on projects valued at $5 million or more.
- Define and pursue innovation strategies for promoting mortgage reduction through dispositioning excess property, including real estate, facilities, and material.
- Complete a disposition schedule for all non contaminated real property (including facilities), identified in the Facility Information Management System as "excess" by October 1, 1999.
- Improve Field Element authorized staffing of Facility Representative to 95 percent.
- Establish a clearing house of training courses required for Core Qualification of Facility Representatives by the end of fiscal year 2000.
- Ensure that maximum efficiency, economy, and reliability are achieved and the savings demonstrated as a result of contract negotiations and regulatory interventions, especially with respect to deregulation within the utility industry. Success will be measured by cost avoidance

greater than at least twice the cost of running the program.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	4,297	4,743	5,182	+439	9.3%
Travel	255	255	255	0	0.0%
Support Services	1,120	584	725	+141	24.1%
Other Related Expenses	2,282	1,918	1,918	0	0.0%
Total, Program Direction	7,954	7,500	8,080	+580	7.7%
Full-Time Equivalents	46	48	48	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Staffing authorized for FY 2000 is 48. The majority (33 of the 48) provides direct services to the field and the Department by enhancing the stewardship of the Department's facilities, infrastructure, and major projects with respect to real estate matters (including disposition), utilities negotiation, facilities inventory and reporting, contract reform, engineering support, and independent assessment of projects. The remaining 15 positions support operations of the Office itself and oversee the management of the ten field offices under FM's purview. This includes policy development, implementation of corporate initiatives, field liaison support, management of the Senior Executive Service cadre in the field, and resource management (both funding and staffing).	4,297	4,743	5,182

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Travel			
Funds staff transportation to the field sites, enables physical participation on task teams, facilitates conducting training for the field, and hosting conferences that support Departmental initiatives and other areas relative to project management, utility rate negotiations, real estate planning, corporate lessons learned, resource validations, facility representative management, independent costs estimates, and quality assurance. Alternative travel methods, such as TeleVideo conference, have been incorporated into normal business operation. As a result, the request for travel funds remains flatlined to the fiscal year 1997 level.	255	255	255

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Support Services			
Finances the technical expertise, corporate systems, and related expenses associated with life cycle asset management implementation. This "cradle to grave" comprehensive planning approach, will result in assets that are efficiently utilized and maintained in a safe and environmentally responsible manner. In FY 2000, there will be more of an emphasis on training development and refining policy guidance in these core areas: project management, facility maintenance, systems engineering, and value management. The two corporate systems, recognized as the Facility Information System (FIMS) - a real estate inventory system, and the Condition Assessment System (CAS) - a facility maintenance database, collectively have the capability to identify all excess buildings and other structures and the related deferred maintenance costs. Efforts are underway to update the data in each. Such data will enable the Department to target high cost areas for footprint reduction and focus on dispositions that generate the highest mortgage reduction savings.			
Beginning in FY 1999 and continuing in FY 2000, the Department is trying to properly align technical support cost with the programmatic missions that receive direct benefit from these efforts. As a result, the primary technical support service costs for real property management and disposal and utility service planning and acquisitions have been extracted from Field Management's support service line. These costs are embodied within the Department's programmatic budgets. The workload in both of these areas is expected to increase significantly, especially with the emphasis on the identification and disposal of excess property and the impacts of deregulation within the utility industry.	1,120	584	725
Other Related Expenses			
Provides funding for employee development and training, computer hardware and software in support of the local area network and federal staff desktops, cosponsorships in lessons learned and process improvement initiatives, and items purchased through the Working Capital Fund, e.g. rent, supplies, mail handling, telecommunications, postage, network systems maintenance, contract audits, and payroll outsourcing, etc.	2,282	1,918	1,918
Total, Program Direction	7,954	7,500	8,080

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits is due to general pay increases, promotions, and within grades.	+439
Support Services	
■ Increase results from the reduction in technical support services for real estate management and utility management within Field Management's budget and the dedication to develop training courses and refine Departmental guidance for the following:	
▸ With the increased emphasis on enhancing the project management implementation within the Department, resources are being dedicated to develop policy, detailed guidance, and training/certification programs, as well as create an automated management database system to tract independent assessment milestones and deliverables.	
▸ Each agency is required by Public Law 104-106, Section 4306 to have a value management process in place such that savings and/or cost avoidances are identifiable based on the consistent application of these principles. The initial training course will be developed in FY 1999. In FY 2000, a more advanced class is planned. With the fundamental ground work established, the cost to implement is expected to be less in FY 2000.	
▸ Course development and technical support in the deferred maintenance area are planned for FY 2000 to ensure consist data is captured and reported by the Field. This will help ensure that the data reported in the Department's Financial Statements meets commonly accepted accounting practices with respect to facility maintenance activity	+141

	FY 2000 vs FY 1999 ($000)
■ **Other Related Expenses**	
The net change is zero as a result of the following:	
▸ The Working Capital Fund decrease is associated with savings resulting from work space consolidations and a re-engineered approach for computer desktop support and maintenance.	
▸ Field Management is a co-sponsor of the Federal Construction Council. Participation enables the Department to obtain technical expertise regarding industry project management practices and established baselines. A modest $5,000 increase is anticipated for FY 2000.	
▸ The increase in information systems supports the acquisition of hardware and software to upgrade Field Management's local area network.	+0
Total Funding Change, Program Direction	+580

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Independent Costs Estimates	579	0	0	0	0.0%
Real Estate Management	161	259	0	-259	-100.0%
Utility Management	320	0	25	+25	>999
Systems Engineering	0	50	50	0	0.0%
Value Management	0	50	50	0	0.0%
Deferred Maintenance	0	0	50	+50	100.0%
Total, Technical Support Services	1,060	359	175	-184	-51.3%
Management Support Services					
Project Management - Studies/Guidance	60	84	175	+91	108.3%
Training and Education - Project Management	0	50	125	+75	150.0%
Training and Education - Systems Engineering	0	91	50	-41	-45.1%
Training and Education - Value Management	0	0	50	+50	>999
Training and Education - Deferred Maintenance	0	0	50	+50	>999
ADP Corporate Systems & Program Support	0	0	100	+100	>999
Total, Management Support Services	60	225	550	+325	144.4%
Total, Support Services	1,120	584	725	+141	24.1%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	50	50	50	0	0.0%
Working Capital Fund	1,182	1,340	1,261	-79	-5.9%
Federal Construction Council	60	60	65	+5	8.3%
Program Support	190	50	50	0	0.0%
Cost Studies	350	0	0	0	0.0%
Information Systems Maintenance and Acquisitions	450	418	492	+74	17.7%
Total, Other Related Expenses	2,282	1,918	1,918	0	0.0%

Board Of Contract Appeals

Mission Supporting Goals and Objectives

The Board of Contract Appeals is an administrative tribunal, responsible to the Secretary and under law for the fair and impartial trial and adjudication of a variety of disputes. With few exceptions, these disputes are related to the Department's acquisition and financial assistance programs. The Board exercises an array of statutory and delegated authorities. Board decisions constitute final agency decisions and are not subject to administrative review or modification. The Board also serves as the principal source of neutrals for acquisition and financial assistance related mediation and other alternative dispute resolution procedures.

The goal of the Board of Contract Appeals is to provide to the fullest extent practicable, informal, expeditious and inexpensive resolution of contract and financial assistance related disputes pursuant to the Contract Disputes Act of 1978, the Alternative Disputes Resolution Act, and other authority The objectives of the office include: contribute to mutually beneficial relationships between the Department and its contractors and financial recipients; hear and decide disputes or resolve them through alternative means, vindicating the Department's and the contractor's or recipient's contractual expectations in an expeditious, economical, fair and impartial manner; and advance the implementation of alternative disputes resolution procedures; contract disputes resolution without trials and decisions saves substantial public and private resources in appropriate cases.

Performance Measures

- Under delegated authority from the Secretary, provide alternative dispute resolution services to cost-reimbursement contracts.
- Implemented fact-finding authority for debarments
- Executed a Memorandum of Understanding with the U.S. Securities and Exchange Commission to act as their agency Board of Contract Appeals.
- Continue to assess benefits of expanded mediation of disputes at the subcontract level in cost-reimbursement contracts
- Continue Board-provided alternative dispute resolution through standardized provisions in cost-reimbursement contract solicitations

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	509	520	636	+116	+22.3%
Travel	6	6	6	0	0
Support Services	0	0	0	0	0
Other Related Expenses	188	189	196	+7	+ 3.7%
Total, Board of Contract Appeals	703	715	838	+123	+17.2%
Full-Time Equivalents	4	5	5	0	0

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits Salaries and Benefits provide funding for full-time permanent and other than full-time permanent employees in the following classes: salaries and wages, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive and other performance awards, and payments to funds for the benefit of employees for workman's compensation payments	509	520	636
Travel Travel funding for staff to conduct trials, mediations/ arbitrations, typically at courthouses and other neutral sites and for employee training travel	6	6	6

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Other Related Expenses include funding for employee training and development and funding to support the Working Capital Fund for rental space, telecommunications, utilities and miscellaneous charges, printing and reproduction, other services (e.g. tuition, experts, neutrals, etc.), operating and maintenance of equipment, purchase of goods and services through government counts, supplies and materials, and equipment. Common administrative services financed through the Working Capital Fund are included in this category	188	189	196
Total, Program Direction	703	715	838

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs. FY 2000 ($000)
Salaries and Benefits	
■ Increase in salaries and benefits is due to general pay increases, promotions, and within-grade increases	+116
Other Related Expenses	
■ Increase in Other Related Expenses due to general rise in price levels for Working Capital Fund	+7
Total Funding Change, Program Direction	+123

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	1	1	1	0	0.0%
Working Capital Fund					
Rental Space	169	173	176	+3	+1.8%
Printing and Reproduction	8	8	8	0	0.0%
Utilities	4	5	6	+1	20.0%
Supplies/software maintenance/other	6	2	5	+3	+150.0%
Subtotal, Working Capital Fund	187	188	195	+7	+3.7%
Total, Other Related Expenses	188	189	196	+7	+3.7%

Congressional & Intergovernmental Affairs

Mission Supporting Goals and Objectives

The mission of the Office of Congressional and Intergovernmental Affairs (CI) is to promote Departmental policies, programs and initiatives through liaison, communication, coordination and interaction with Congress, State, local, and Tribal governments, other Federal agencies, stakeholders, and the general public.

The office is charged with serving the needs of a wide range of customers, including Members of Congress and Committees; State, local and Tribal governments; DOE stakeholders; consumer and public interest groups, and Federal and contractor employees. The mission and its incumbent responsibilities are well served by the office's functioning as a "one stop shop" for information about the Department's energy, national security, science and environmental business lines. The release of timely, factual information and a commitment to creating opportunities for early customer involvement in the Department's decision-making process have contributed to the office's success in fulfilling its mission and achieving its goals and objectives.

The office strives for continuous improvement in its partnerships with constituent groups and stakeholders. These efforts are supported through close collaboration with DOE officials and program staff on the development and implementation of legislative strategies; by communicating DOE's missions and benefits to our primary customers; and through rapid response to our customer's requests for information.

Program Goals

- Embrace the importance of keeping the nation's citizens informed, and provide information to Members of Congress, Committees and staff, State, local, and Tribal officials, American taxpayers; contribute to a broad national understanding of the Department's mission in areas ranging from energy security to economic development and national security; and support the statutory requirements of the DOE Organization Act, Public Law 95-91, to provide liaison between the Department, Congress, and the general public.
- Build trust and ensure public understanding of the importance of Department of Energy (DOE) policies, programs, and initiatives.
- Comply with DOE's Acquisition Regulation which directs this office to advise Members of Congress regarding pending awards that have an impact upon the Members' State/District.
- Communicate to all of our customers through its work advising and coordinating with program offices on matters relating to congressional, intergovernmental, and tribal, and other outreach activities. In doing so, we deliver on our commitment to a policy of openness and accessibility.

- Provide timely, responsive information in anticipation of customer needs and targeted to the full range of DOE customers -- from Members of Congress, Committees and staff, governors, tribal leaders, local elected/appointed officials, and community groups around DOE sites, to professionals in the business, environmental, and national security communities.
- Support early and effective customer involvement in DOE decision making by improving coordination of stakeholder activities that cross-cut other DOE programs.
- Prepare briefing materials for the Secretary, Deputy Secretary and Under Secretary in preparation for meetings with Members of Congress and stakeholders.

Performance Measures

- Measure overall performance through customer feedback, leadership's ability to meet commitments and program objectives and feedback from our employees.
- Assist program offices in their preparation of official Departmental testimony and accompany senior Departmental officials to approximately 70 hearings. Assisted program offices in preparation for those hearings.
- Attend over 3,000 briefings and meetings and over 60 committee markups in performance of CI's liaison functions.
- Research, prepare, and/or review:
  - 100 briefing books/papers regarding Congressional hearings and meetings;
  - 3,200 pieces of Congressional correspondence, developed with program offices on program/policy issues;
  - 90 reports on Congressional hearings, coordination of 86 hearing statements, 1,655 pre- and post-hearing Questions and Answers; 97 inserts for the record; and 1,000 congressional letters relating to hearings;
  - 250 Daily Reports and 52 Weekly Reports for senior Departmental officials providing detailed congressional and intergovernmental information on meetings, hearings, mark-ups, site visits and other major events;
  - Numerous Congressional notifications on Departmental program issues and major announcements;
  - 3,000 contract and grant notifications for Members of Congress requiring over 9,000 congressional notifications, and to affected Governors;
  - Several thousand notifications to Governors/Tribal leaders/American Indian Organizations/ consumer groups and industry of major actions;

- 200 invitations for meetings or appearances by the Secretary and other principal Departmental officers with intergovernmental or public liaison groups;
- 535 biographies for Members of Congress (including energy-related information, Committee assignments, energy and environment-related legislation sponsored and co-sponsored by Member(s), background information on Departmental facilities in Member's District/State, and major energy interests and concerns); and
- 100 State Briefing Papers prepared for Administration officials covering energy issues and concerns for the relevant State.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	3,424	4,031	4,060	+29	+0.7%
Travel	46	60	60	0	0.0%
Support Services	0	25	25	0	0.0%
Other Related Expenses	867	784	765	-19	-2.4%
Total, Congressional & Intergovernmental Affairs	4,337	4,900	4,910	+10	+0.2%
Full Time Equivalents	37	40	40	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Provides funding in FY 2000 for 40 full-time equivalent and other than full-time permanent employees. Funding includes: salaries and benefits, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive Service and other performance awards, and payment to funds for workmens' compensation.	3,424	4,031	4,060
Travel			
Travel provides funding for official travel for site visits to facilities of interest to Congress; to attend conferences and meetings with State and local governments, American Indian tribal officials; and meeting with public interest groups representing consumer, business and community groups and a broad range of DOE stakeholders to convey DOE initiatives and policies; and travel associated with training.	46	60	60
Support Services			
Support Services provides funding for computer support for advancing communications technologies and development of enhanced communications tools, e.g., HomePage, SpectraFax, and other technical computer services.	0	25	25

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Other Related Expenses provides funding for employee training and development; other program support for consumer affairs for services supporting dissemination of information to the general public/consumers regarding new events and energy information and development and enhancement of systems to expedite information flow and other outreach activities; and services included in the business lines of the working capital fund, for example, office space, building operations and maintenance, postage, telephone service, printing and graphics, copying, supplies/equipment, etc.	867	784	765
Total, Program Direction	4,337	4,900	4,910

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ The personnel compensation and benefits reflects an increase due to cost of living adjustments, promotions and performance awards, offset by a decrease in salary costs associated with a lowered FTE usage rate for approximately six months of FY 1999.	+29
Travel	
■ Travel reflects no increase.	0
Support Services	
■ Support services reflects no increase.	0

Other Related Expenses

- Other related expenses reflects a decrease in other program support for consumer affairs for services supporting dissemination of information to the general public/consumers and other outreach activities ($-9,000), and a reduction in the working capital fund ($-10,000) ..... -19

Total Funding Change, Congressional & Intergovernmental Affairs. ..... +10

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services	0	25	25	0	0.0%
Total, Support Services	0	25	25	0	0.0%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	% Change	% Change
Training	3	4	4	0	0.0%
Other Program Support--Consumer Affairs	40	30	21	-9	-30.0%
Working Capital Fund	824	750	740	-10	-1.3%
Total, Other Related Expenses	867	784	765	-19	-2.4%

Public Affairs

Mission Supporting Goals and Objectives

The mission of the Office of Public Affairs is to communicate information about DOE's work in a timely, accurate and accessible way.

The office is responsible for overall public affairs for the Department, including communicating Departmental policies, initiatives and information to the news media and the general public; managing and coordinating public affairs activities for Headquarters, field offices and sites, and DOE laboratories; serving as primary spokesperson for the Department; responding to requests for information from the public and the news media; arranging interviews with the news media; providing speechwriting services to the Secretary, Deputy Secretary and Under Secretary; preparing written information about Departmental activities; reviewing publications, audiovisuals, and exhibits; compiling news clips; and managing the Department of Energy's Home Page.

Program Goals

- Communicate information about the Department in a timely, accurate and accessible way to the news media and the public.
- Deliver on the Department's commitment to openness and public participation in decisionmaking through wide dissemination to the press of documents relating to NEPA process, Superfund and other regulatory processes.
- Provide public affairs guidance and services to program and field offices including writing news releases, planning news conferences, arranging interviews, preparing and editing written and visual materials.
- Manage and operate the public inquiries room and respond to walk-up visitors inquiring about the Department's programs and activities and research and respond to telephone and written inquiries.
- Improve internal communications by writing and publishing a monthly newsletter about current events around the Department, and compiling and distributing news clips about Departmental activities.
- Provide coordinated review of non-technical Departmental publications, audiovisual materials, and exhibits to ensure consistency, cost-effectiveness and clarity.
- Prepare speeches, briefing materials, and analysis to the Secretary, Deputy Secretary, Under Secretary and principal secretarial officers in support of their work to explain Administration and Departmental policies, initiatives and actions.

Performance Measures

- Measure performance through customer feedback, ability to meet commitments and program objectives.
- In support of serving as an intermediary with the news media, DOE stakeholders, and the general public, staff resources:
  - Plan and coordinate 120 press conferences, over 300 press releases and responded to over 20,000 inquiries for information or interviews from the news media;
  - Operate the Departmental public inquiries office that handles requests concerning all DOE program and activities, responding to over 14,000 public inquiries from students, schools, colleges, libraries, industry, businesses, Federal agencies, State and local governments, and private citizens;
  - Produce and distribute 12 editions of the Departmental news magazine to DOE employees and contractors with external copies sent to Congressional offices, Federal agencies, State and local governments, news media, libraries, colleges, schools, energy-related trade associations and public interest organizations, embassies and others on request;
  - Redesign and assumed editorial control of the Department of Energy's Home Page to make it more accessible and informative providing information to the public;
  - Compile news clips articles from 50 major newspapers, five regional papers, eight weekly magazines/journals and produce/distribute over 500 copies of news, magazine, and regional clips; and
  - Reviewed/approved over 175 publications, exhibits and audiovisuals of Departmental activities.
- In support of the Department's mission:
  - Assist, advise, and/or prepare speeches, talking points, and presentations for the Secretary;
  - Communicate guidance and coordinate activities with Field and Laboratory public affairs offices; and
  - Coordinate and provide strategic information of schedules for major announcements.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	2,325	2,494	2,794	+300	+12.0%
Travel	67	70	84	+14	+20.0%
Support Services	0	0	125	+125	+100.0%
Other Related Expenses	1,021	936	960	+24	+2.6%
Total, Public Affairs	3,413	3,500	3,963	+463	+13.2%
Full Time Equivalents	26	31	31	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Salaries and Benefits in FY 2000 provides funding for 31 full-time permanent and other than full-time permanent employees, in the following classes: salaries and benefits, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive Service and other performance awards, payment to funds for workmens' compensation.	2,325	2,494	2,794
Travel			
Travel provides funding for official travel to arrange and lead all media events, to accompany the Secretary, Deputy Secretary, and Under Secretary at public appearances; to attend conferences and meetings with Public Affairs Field Directors; and a broad range of DOE stakeholders to convey DOE initiatives and policies; and travel associated with training.	67	70	84
Support Services			
Support Services provides funding for computer support for advancing communications technologies and development of enhanced communications tools, e.g., Home Page, SpectraFax, and other technical computer services	0	0	125
Other Related Expenses			
Other Related Expenses provides funding for employee training and development; other program support for public affairs for services relative to producing the daily news clips and radio/TV transcription services; and items included in the business lines of the working capital fund, for example, office space, building operations and maintenance, postage, telephone service, printing and graphics, copying, supplies/equipment, etc.	1,021	936	960
Total, Program Direction	3,413	3,500	3,963

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ In FY 1999, Public Affairs will utilize approximately $200,000 in carryover balances to cover a funding shortfall for employees currently on board. The increase in FY 2000 represents new budget authority of $200,000 to continue employment at 31 FTEs, and a $100,000 increase due to cost of living adjustments, promotions and performance awards.	+300
Travel	
■ Travel reflects a slight increase to allow staff to accompany Secretary, Deputy Secretary, and Under Secretary at public appearances.	+14
Support Services	
■ Support services reflects an increase for computer support for advancing communications technologies and development and other technical computer support.	+125
Other Related Expenses	
■ Other related expenses reflects an increase in training ($+5,000) and other program support for services associated with the preparation of daily news clips and radio/TV transcription services ($+11,000). There is an increase in the working capital fund ($+8,000).	+24
Total Funding Change, Public Affairs.	+463

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services	0	0	125	+125	+100.0%
Total, Support Services	0	0	125	+125	+100.0%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	3	0	5	+5	+100.0%
Other Program Support--Public Affairs	50	59	70	+11	+18.6%
Working Capital Fund	968	877	885	+8	+0.9%
Total, Other Related Expenses	1,021	936	960	+24	+2.6%

General Counsel

Mission Supporting Goals and Objectives

The Office of General Counsel is responsible for providing comprehensive legal services to the Secretary and the Department. These services include legal counsel with respect to every program and function of the Department, except those relating to the Federal Energy Regulatory Commission and Environment, Safety, and Health's administrative enforcement activities related to Nuclear Safety. General Counsel assures that the Department operates in compliance with applicable laws and regulations. The position of General Counsel is established by Public Law 95-91, Section 202(b).

Performance Measures

- General Counsel utilizes feedback from customers and General Counsel personnel, and reviews such as those conducted by the DOE Inspector General and the General Accounting Office as bases for measures of performance.
- The Office of Alternate Dispute Resolution is committed to increasing by 20% the number of workplace disputes mediated, increasing by 20% the number of litigation cases mediated and demonstrating estimated savings of 50% in litigation costs.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999[a]	FY 2000	$ Change	% Change
Salaries and Benefits	15,802	15,746	16,788	+1,042	+6.6%
Travel	128	100	83	-17	-17.0%
Support Services	236	496	720	+224	+45.2%
Other Related Expenses	3,490	3,550	3,843	+293	-8.3%
Subtotal, General Counsel	19,656	19,892	21,434	+1,542	+7.8%
Use of Prior-year Balances	0	-642	0	+642	-100%
Total, General Counsel	19,656	19,250	21,434	+2,184	+11.3%
Full Time Equivalents	167	162/168[a]	164		

[a]Although the internally approved manpower level for General Counsel is 168 FTEs, enacted funding for FY 1999 does not fully fund the projected staffing level of 162 FTEs. Therefore, in order to maintain its commitment to provide adequate legal services to the Department, GC will utilize carryover of about $642,000 in FY 1999 to cover the shortfall.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Provides funding in FY 2000 for 164 full-time equivalent employees to include salaries, overtime, incentive awards, lump sum leave, SES and other performance awards, payments on behalf of employees for payments to funds such as workman's compensation, unemployment compensation and buyouts. In FY 2000 there is a slight increase in funding provided for additional FTEs to address critical hires in such key areas as additional legal services for the Waste Fund and Environmental Management programs	15,802	15,746	16,788
Travel			
Provides funding for employees to attend hearings, court trials, proceedings, and to take depositions wherever necessary. Also provides funding for conference attendance and travel to attend training	128	100	83
Support Services			
Provides funds for technical support services, including: computer/LAN operations, staffing of the DOE law library, outside attorneys to process intellectual property actions, and consulting and software programming services to receive, process, and track transactions for a nationwide intellectual property database	236	496	720
Other Related Expenses			
Provides funding for Dept. Of Commerce fees for intellectual property prosecution, law library books and materials, employee training, and items included in the Working Capital Fund (rent, utilities, building operation and maintenance, supplies, telephone, DOE wide computer/LAN operations, etc.)	3,490	3,550	3,843
Use of Prior Year Balances	0	-642	0
Total, General Counsel	19,656	19,250	21,434

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs FY 2000 ($000)
Salaries and Benefits	
■ The increase of $1,042,000 reflects the hiring of two additional critical Deputy General Counsels ($300,000), the effect of replacing outgoing attritions with critical senior grade employees ($142,000), the full effect of the FY 1999 pay raise and the partial effect of the FY 2000 pay raise ($400,000), and increased SES and PMS bonus awards to an allowable level of 3% of base pay ($200,000).	+1,042
Travel	
■ The decrease of $17,000 reflects an expected decrease in the level of GC travel requirements.	-17
Support Services	
■ The increase of $224,000 consists of a $114,000 increase in intellectual property costs, a $160,000 increase in computer/LAN support (which represents costs for the maintenance of a DOE nationwide database used for recording and reporting all DOE funded costs for outside legal services relative to DOE contractor litigation), and a decrease of $50,000 in law library contractor personnel services.	+224
Other Related Expenses	
■ The increase for Other Related Expenses primarily consists of a $13,000 inflationary increase in law library books and materials, a $28,000 inflationary increase in intellectual property costs, and a $250,000 increase to cover patent costs which were previously funded by uncosted balances with the Dept. of Commerce.	+293
Total Funding Change, General Counsel	+1,542

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Intellectual Property	136	136	250	+114	+83.8%
Computer / LAN	0	260	420	+160	+61.5%
Law Library - Personnel ...	100	100	50	-50	-50.0%
Total, Support Services	236	496	720	+224	+45.2%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Law Library - materials	315	315	328	+13	+4.1%
Training	20	20	21	+1	+5.0%
Government Agencies - Intellectual Property	177	284	562	+278	+97.9%
Working Capital Fund	2,958	2,911	2,922	+11	+0.4%
Other	20	20	10	-10	-50.0%
Total, Other Related Expenses	3,490	3,550	3,843	+293	+8.3%

Policy and International Affairs

Mission Supporting Goals and Objectives

In this era of radically shifting priorities and sharply reduced budgets, the Secretary and the Department increasingly rely on the Office of Policy and International Affairs (PO) to establish clear goals, develop policies, analyze policy impacts, mobilize resources, and launch new initiatives to reduce the cost and enhance the effectiveness of DOE programs. The objectives of the Office of Policy and International Affairs are to identify and develop policies based on sound analysis that support the Department's vision and fulfill the Department's mission, provide accurate and unbiased analysis of existing and prospective policies in the areas of energy, environment, science and technology, and national, economic, energy and environmental security; ensure attention to energy needs and perspectives as decisions with significant energy implications are considered by other departments and agencies; ensure effective communication of Administration and Departmental policies, priorities, objectives, and measurements; to advance energy, environmental, and non-proliferation policies in international agreements; and to promote positive relationships with foreign nations that support U S. policy goals.

Performance Measures

- Effective analysis and advocacy to assure that Federal regulatory activities of other agencies affecting the energy sector are consistent with National energy policies and do not impose unnecessary energy costs on consumers and producers, as measured by the number of analyses completed and comments provided and by the cost savings achieved by changes in regulatory proposals resulting from our interventions.

- Effective analytical and policy development activities in support of the Administration, Federal Energy Regulatory Commission (FERC), Congress and states to increase reliance on competition in energy markets to benefit consumers while maintaining a sufficient level of environmental protection and high energy reliability, as measured by number and influence of analyses provided and by customer satisfaction

- Leadership in the analysis, policy development, and negotiation processes surrounding global climate change, as measured by number and influence of analyses supporting cost-effective, flexible approaches to mitigation that reflect a realistic appraisal of energy needs and priorities.

- Maintenance and effective utilization of energy modeling capabilities, as measured by success in meeting requests from the Administration and Congress for timely analysis of emerging energy issues.

- Effective support of U.S. economic, environmental and national security policy goals, as measured by the magnitude of foreign actions or international energy policy, regulatory and legislative actions that are attributable, in part, to Departmental efforts, and by adoption of DOE positions by multilateral organizations.

- Improved efficiency in the Department's international R&D-related activities as measured by cost savings from collaboration among DOE programs on international activities. Further, effective development and implementation of international research and development agreements, as measured by the number of R&D agreements and/or related modifications concluded and the value of information or experience acquired in support of, and complementary to, domestic R&D programs

- Effective analytical and policy development activities in support of the Administration's national security objectives on nuclear materials stewardship, non-proliferation, stockpile stewardship, national security, environmental management, and health and safety of the general public and DOE employees as measured by the number and influence of analyses provided and by customer satisfaction.

- Effective development of science and technology policies in support of Departmental missions in fundamental science, mission-driven research and development, laboratory missions and management, and international science and technology cooperation, as measured by the number and influence of analyses, papers, meetings, teaming arrangements, task forces, workshops, reports, publications, and other means of communicating and effecting policy formulation and change in the Department's science and technology policies and programs.

- Effective implementation of the DOE Strategic Management System, as measured by the degree to which the Department's program strategic plans and individual performance evaluation standards reflect the priority goals from the Department's Strategic Plan and the degree to which the Department's Strategic Plan, budget, Annual Performance Plan, and Annual Performance Report are aligned. Further success will be ensured by the satisfaction of Congressional and OMB stakeholders that the Department is in full compliance with the Government Performance and Results Act of 1993.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	11,423	11,479	13,000	+1,521	13.3%
Travel	507	500	1,000	+500	100.0%
Other Related Services	3,620	2,021	3,430	+1,409	69.7%
Total, Program Direction	15,550	14,000	17,430	+3,430	24.5%
Full Time Equivalents	111	113	120	+7	6.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Provides funding for 120 full-time permanent and other than full-time permanent employees, in the following categories: salaries and wages, the Department's FICA contribution, unemployment and workman's compensation, health benefits, thrift savings plan, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive Service and other performance awards, and permanent change of station moves Additional FTEs are requested to balance critical skills mix after the reorganization of Policy.	11,423	11,479	13,000
Travel			
Funds staff transportation to field sites to participate on task teams that impact Departmental initiatives and other areas relative to domestic and international energy, science and technology, environmental, and non-proliferation policies. These funds also allow employees to attend conferences and training workshops	507	500	1,000
Other Related Expenses			
Provides funding for working capital expenditures, subscriptions, telephone credit cards, pagers, portable phones, interpreters, ADP hardware and software acquisition, LAN administration, international phone charges, budget and accounting systems maintenance and training.	3,620	2,021	3,430
Total, Program Direction	15,550	14,000	17,430

Explanation of Funding Changes From FY 1999 To FY 2000

	FY 1999 vs. FY 2000 ($000)
Salaries and Benefits	
■ Reflects an increase due to cost of living adjustments and general inflation for current staff plus an additional 7 FTEs.	+1,521
Travel	
■ Expected increase due to expanding international travel to support secretarial initiatives, conferences supporting the National Energy Policy Plan, and ongoing Climate Change Workshops	+500
Other Related Expenses	
■ Increase is directly correlated to FTE increase; will support additional administrative needs and Working Capital Fund expenses.	+1,409
Total Funding Change, Program Direction	+3,430

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	70	50	70	+20	40.0%
Working Capital Fund	2,779	1,900	2,800	+900	47.3%
Purchases from Government Accounts [a]	589	71	560	+489	687.3%
Other [b]	182	0	0	+0	0.0%
Total, Other Related Expenses	3,471	2,021	3,430	+1,409	69.7%

[a] Includes non-WCF expenditures for subscriptions, telephones, credit cards, pagers, portable phones, interpreters, ADP hardware/software acquisitions, LAN administration, international phone charges, and budget and accounting system maintenance.

[b] Included funds for PO's overseas offices in Moscow, Paris, and Tokyo; since FY 1998 offices were transferred to the Office of Nonproliferation and National Security and Office of Nuclear Energy, Science and Technology.

Policy and International Affairs Program Support

Program Mission

The Office of Policy and International Affairs (PO) is the primary policy advisor to the Secretary and the Department on national and international energy policy matters. Our role is to render advice to the leadership of the Department and represent the Department in interagency discussions, based on a broader range of policy objectives than would be found within the Department's separate program offices.

Program Goals

- Advocate the Department's policies on energy, environmental and national security issues in decision- making processes with other Departments and agencies.
- Ensure effective and consistent implementation and communication of Administration and Departmental policies and priorities.
- Effectively engage the international community in discussions and actions to advance energy, environmental, and non-proliferation policies through multilateral international agreements and bilaterally with key foreign nations to support U.S. policy goals.

Program Objectives

- **Policy Development**: PO identifies, develops and analyzes policy issues, helps define long-term goals, objectives, and priorities, and mobilizes appropriate program offices to participate in these activities.
- **Policy Analysis**: PO provides the Secretary, Deputy Secretary and the Under Secretary independent analysis and program assessment. In this context, PO is deemed independent because they have no vested or parochial interests in specific DOE programs. During the decision-making process, the Secretary is assured of impartial and unbiased policy advice from PO.
- **Policy Coordination**: PO is the central DOE organization that develops and coordinates domestic and international policy initiatives and strategies on issues that cut across more than one program area. PO prevents "stove piping" by facilitating the development of integrated and coordinated policy approaches across all of the Department's functions. PO also ensures that DOE is aligned with core national goals and objectives. Ongoing Policy responsibilities include coordination of the Department's international activities.
- **Policy Communication**: PO provides a policy communication link between DOE and its stakeholders including other agencies, Congress, State and local governments. PO ensures that the views of the White House, Congress, public and private sector organizations, and foreign countries are addressed in the policy making process. PO is the Department's representative on

many domestic and international policy initiatives and provides information on Departmental, national and international policies, strategies, and trends

- **Policy Oversight**: PO ensures that Secretarial policies and priorities are implemented throughout the Department's planning and budgeting processes These activities include development of the Department's strategic plans, annual performance plans, budgets and the Performance Agreement with the President PO also ensures Secretarial priorities are upheld during the evaluation of program performance against Secretarial commitments and annual performance reporting

Significant Accomplishments and Program Shifts

- Served as the Department's pathfinder for U.S energy industry trade and investments throughout the world, including oil and gas production and pipeline transportation infrastructure. PO continued to develop and implement Department-wide regional energy trade and investment strategies aimed at promoting energy policy and market reform, U.S. industry investment and sustainable energy programs and nuclear non-proliferation policies Recently, PO served as the central Departmental office in advancing the Administration's policy in the Caspian region to promote U.S. company involvement in oil and gas production and building pipeline infrastructure.

- Provided the primary expertise in the restructuring of the electric utility industry. PO led the Department's analytical assessment of the electric industry restructuring effort PO analysts conducted modeling assessments to estimate the effects of industry changes on future energy security, reliability of supply, and financial and environmental implications. This resulted in the March 25, 1998 Administration announced Comprehensive Electricity Competition Plan. PO continues the analytical studies of electric industry restructuring in order to estimate effects of industry changes on future energy security, reliability of supply, and financial and environmental implications.

- Assured balanced consideration of energy issues in the development of Administration environmental policies. PO led the Department's effort to determine, during the formulation stage, the impact of environmental and energy policies on such factors as employment, gross output, and the competitiveness of energy intensive industries. Such analyses resulted in the Department having the opportunity to affect the Administration's development of policies that properly weigh energy economic impacts in achieving environmental objectives

- Provided the corporate capability for the development of the Comprehensive National Energy Strategy. PO led the Department's effort to develop the Comprehensive National Energy Strategy which reflects the vital role energy plays in our economy and the importance that the Administration attaches to having a well defined energy policy.

- Provided the overall management and coordination of the Department's Strategic Planning under the Government Performance and Results Act (GPRA). PO continued to provide, through the DOE Strategic Plan, central guidance to Departmental program offices to focus DOE's broad and diverse programs on achieving national energy goals and objectives. PO also continued

overseeing the Department's effort to ensure improving public accountability as part of the Government Performance and Results Act (GPRA).

- Developed corporate approaches to solve problems. PO established the first corporate asset management program which generated $35 million in revenues.

- Coordinated DOE's international science and technology agreements. PO continued to coordinate foreign policy/national security and international energy policy direction for DOE's international science and technology agreements and negotiated agreements with foreign governments for DOE program offices

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Policy Analysis and System Studies	500	350	1,000	+650	185.7%
Environmental Policy Studies	1,750	2,000	2,432	+432	21.6%
Total, Program Support	2,250	2,350	3,432	+1,082	46.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Policy Analysis and System Studies			
■ **Strategic Planning and Program Evaluation**			
▸ Develop and publish the annual Update of the DOE Strategic Plan, develop and publish the Annual Performance Plan, and track performance data and publish annual Performance Report	51	35	50
▸ Prepare and publish a Performance Agreement with the President or revision to the Performance Plan after the budget is enacted by Congress to reflect changes	80	50	80
▸ Manage and improve the Department's Strategic Management System linking strategic planning, performance planning, budgeting, performance management, and performance reporting from the Departmental level down to the employee and contract level	5	50	5

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Manage the Department's 5-Year integrated planning and budgeting process and coordinate department-wide cross-program analysis to identify opportunities for improved integration	30	10	30
▸ Manage a managerial accountability and responsibility framework through formal Performance Agreements between the Secretary and his direct reports	20	5	20
▸ Manage the development of crosscutting Strategic Plans (e.g., International Programs, Environmental Security, etc.)	20	5	20
■ **Oil Security**			
▸ Provide analytic support and implementing strategies for Departmental initiatives to increase or ensure domestic supplies of oil and natural gas	35	30	65
■ **Science and Technology Policy**			
▸ Evaluate overall effectiveness of DOE international R&D agreements database and necessary enhancements	25	25	50
▸ Implement the Department-wide policy on R&D evaluation, in compliance with and support of the Government Performance and Results Act	25	25	50
■ **National Security**			
▸ Establish annual reporting on the status, issues and opportunities for nuclear materials management in the U.S.	50	25	50
■ **International Energy Policy**			
▸ Encourage regional cooperation and policy and regulatory reform in support of energy resource development in Russia, the former Soviet Union, Latin America and Asia.	129	105	530

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **Electricity and Natural Gas**			
▸ Support Office of the Secretary in preparing next National Energy Policy Plan, i.e. Comprehensive National Energy Strategy	30	30	50
Total, Policy Analysis and System Studies	500	350	1000
Environmental Policy Studies			
■ **Pollution and Climate Change**			
▸ Continue Departmental participation in international negotiations to develop a regional protocol controlling nitrogen oxides and a global treaty controlling persistent organic pollutants under the United Nations Economic Commission for Europe, and Environment Program respectively	100	100	150
▸ Refine policy cost models to address evolving strategies on climate change issues	20	30	50
▸ Advocate the Department's views on key domestic regulatory issues with substantial energy implications, including particulate matter standards, implementation of ozone standards, the setting of air toxic emissions levels for utilities and trucks, review and possible revision of fine particulate ambient air standard, and integration of measures to attain particulate matter ambient standard and regional haze goals.	100	150	150
▸ Update the energy section of the U.S. Climate Action Report which provides a status of U.S. government climate change activities that have resulted from the 1993 Climate Change Action Plan	50	75	75
■ **Oil Security**			
▸ Develop and assess modifications to alternative fuels policies to improve their overall effectiveness in providing clean and cost-competitive energy supplies	25	30	50

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Continue the assessment of refinery capabilities to produce fuels required by a variety of technologies under consideration by the Partnership for a New Generation of Vehicles programs and other transportation technology developers.	50	50	50
▸ Apply refinery analysis capabilities to contemporary environmental issues, likely including implementation by 2004 of Tier II automobile and light truck standards as well as heavy duty truck standards.	50	50	100
■ **Electricity and Natural Gas**			
▸ Work with federal and state agencies, the electric power industry, consumer, and special interest groups to implement legislative and regulatory reform in the electric industry.	50	75	100
▸ Continue joint DOE/NARUC Electricity forums to promote federal and state cooperation and dialogue on restructuring issues	125	150	200
▸ Conduct analyses of electric industry restructuring to guide implementation of legislation and regulatory reforms.	350	350	380
▸ Participate in federal regulatory proceedings regarding the implementation of new electricity restructuring legislation.	100	100	150
■ **Integration of Energy, Economic and Environmental Policies**			
▸ Develop analytic frameworks to address the potential for market power in the electric power transmission network.	50	50	50
▸ Integrate national technology-specific industrial production models into a consistent international framework.	95	100	100
▸ Provide policy support to program office participation in the development of a new model energy code that will be the basis for future residential energy efficiency in the U.S. and elsewhere, as required under EPACT.	50	75	75

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ **International Energy Policy**			
▸ Critique gains to date of US domestic and international energy policy objectives in multilateral and bilateral energy policy fora.	75	95	100
▸ Identify near and long term United States government energy policy objectives to determine levels of continued involvement in bilateral and multilateral fora.	100	125	145
▸ Strengthen international oil emergency preparedness policies and response mechanisms.	35	50	75
▸ Evaluate appropriate steps to rehabilitate energy development and advance regulatory reform in Asia markets.	50	75	100
▸ Continue to promote regional cooperation and selection of a Main Export Pipeline route from Central Asia to hard currency markets.	25	50	50
■ **Science and Technology Policy**			
▸ Assess feasibility, implement case studies and evaluate the Department's International Grants Program for Scientific and Technological Cooperation.	50	50	50
▸ Implement decisions on environmental restoration and waste remediation at the Hanford Reservation in cooperation with the DOE national laboratories.	50	50	50
▸ Close discussions with the Russians on the idea of a nuclear waste repository in the former Soviet Union.	0	20	25
■ **National Security, Materials Management, and Energy and Environmental Security**			
▸ Implement Energy and Environment Security Initiative to enable the Department to influence the United States on foreign policy by merging energy and security concerns to achieve common objectives.	50	50	75

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ In conjunction with the Office of Nuclear Energy, monitor the status of life extension at the nation's commercial nuclear power plants and the status of early nuclear plant retirements associated with changes in the utility industry.	50	25	40
▸ In conjunction with the Offices of Nuclear Energy and Civilian Radioactive Waste Management, monitor the status of funding for decontamination and decommissioning by the nation's commercial nuclear power plants.	50	25	42
Total, Environmental Policy Studies	1,750	2,000	2,432
Total, Program Support	2,250	2,350	3,432

Explanation of Funding Changes From FY 1999 To FY 2000

	FY 1999 vs. FY 2000 ($000)
Policy Analysis and System Studies/Environmental Policy Studies	
■ Increase in funds will support the Administration's proposal to increase the competitiveness of the electric sector by enhancing the modeling capabilities by improving the representation of physical power flows to more accurately represent the likely impact of competition on prices to specific areas of the country and to more accurately assess the potential electric reliability implications of environmental policies, to support electric sector restructuring and climate policy objectives, resources will be used to support studies that assess the impact of changing power markets on nuclear plant retirement decisions, the efficiency of fuel use at coal-fired plants and consumer decisions regarding the voluntary purchase of "green power"; develop the analytical basis for evaluating and crediting emission reductions to reduce greenhouse gas emissions; provide increased technical and analytical assistance to enable developing countries to identify the technological opportunities for reducing emissions and the benefits of active participation in global emissions trading; promote regional cooperation in electricity and gas markets and sustainable energy development in Sub-Saharan Africa; advance policy and regulatory reform and open markets in the Asian Pacific Area as a result of the Asian Financial Crisis; address policy, regulatory and institutional issues in specific countries (Caspian region, Central America, Southern Africa, South Asia) to foster progress in promoting regional integration of gas and electricity distribution systems and markets; assist developing countries to promote the deployment of sustainable energy technologies	+1,082
Total Funding Change, Program Support	+1,082

Economic Impact and Diversity

Mission Supporting Goals and Objectives

The goals of the Office of Economic Impact and Diversity are to: become a recognized leader among Federal agencies in managing diversity as a strategic imperative, ensure equitable opportunities for small, minority, and women-owned businesses to compete for contracts and subcontracts; promote collaborative efforts with educational institutions, Federal agencies, and energy industry organizations to establish state-of-the-art research and development centers of excellence at the universities; conduct ongoing research programs to determine the effects (including the SocioEconomic and environmental effects) of national energy programs, policies, and regulations of the Department on minorities; facilitate small business growth in contracting opportunities with DOE, ensure that the Department is addressing the provisions of Executive Order 12898 and that the environmental justice strategies are being implemented in an effective manner; partnership with minority educational institutions, small and women owned businesses, and financial communities in order to enhance their upward occupational, economic and social mobility; implement the Civil Rights Act; enforce affirmative employment programs; and implement the Department's nationwide whistle blower reform initiatives. This office will work to (1) develop and maintain the framework and mechanisms for an aggressive Department-wide 10-Point Civil Rights, Affirmative Employment, and Equal Opportunity Plan; (2) establish and implement uniform employee concerns policies for resolution of environmental, health and safety, and human resources disputes, (3) foster and enhance diversity in the DOE workforce; (4) develop minority educational assistance programs, and (5) devise small business contracting plans. This program office will also implement African-American, Hispanic, Asian, and other minority educational assistance programs; evaluate contractor plans and performance to assure full implementation of the Department's Diversity Contract Clause; monitor the results of the 10-Point Civil Rights Plan with regard to hiring, promotions, training, and equitable treatment, ensure DOE Federal and contractor employees have effective means of voicing health, safety, environment, fraud, waste, abuse, whistle blower retaliation concerns; avoid prolonged and costly litigation through the use of alternative dispute resolution, including mediation; utilize greater management tools to assess effectiveness of employee concerns program to ensure employee concerns are considered fully, fairly and timely, and set forth a vision statement which fosters and embraces diversity throughout the Department.

Office of Small and Disadvantaged Business Utilization

The Office of Small and Disadvantaged Business Utilization is legislated by P.L. 95-507, for the oversight Departmental programs regarding the development and execution of policies and programs, to ensure that an equitable portion of the total contracts and subcontracts for the Department's services and supplies are procured with small business enterprises. This program effort is to achieve the Department's small business percentage goals to maintain current level of funding. The program activity level is appropriate based on OSDBU's responsibility within the Department for policy, plans, and oversight of execution of functions under the Small Business Act and Executive Orders 12073 and 12138.

- **Significant Accomplishments and Program Shifts**
  - Codified the comprehensive DOE/SBA Delegation of 8(a) Contracting Authority Memorandum

of Understanding and the Department's Diversity Plan.

- Coordinated and co-chaired various business expositions and partnering fairs such as the "Minority Enterprise Development Week."

- Collaborated, prepared and co-chaired the development of new training regulations with regard to Historically Under-utilized Business (HUB) Zone small and disadvantaged business contracting and wrote DOE policy recommendations for inclusion in "Building Communities for the 21st Century".

- Represented the Department at, and coordinated various Hispanic business activities such as the U.S. Hispanic Chamber of Commerce's Annual Awards Conference in Kansas City, the annual California Hispanic Chamber of Commerce Conference, and the Hispanic Association of Colleges and Universities Workshops in San Diego.

- Established an additional 10 mentor-protégé agreements between DOE and small disadvantaged businesses located in Richland, Washington, Oak Ridge, Tennessee, Beavercreek, Ohio, and Newington, Connecticut. 3 DOE Mentor-Protégé Program firms completed program and will now continue independently of ED. Coordinated Mentor-Protégé signing ceremonies between Oak Ridge National Laboratory and AIMSI, a 8(a) small disadvantaged business firm. Completed proposed DOE Mentor-Protégé regulations to replace Mentor-Protégé Initiative Final Guidelines published in the Federal Register.

- Developed a "Forecast of Contracting and Subcontracting Opportunities" for fiscal year 1999, containing 200 contracting and subcontracting opportunities totaling more than $250 million. Distributed copies to the National Network of Small Business Program Managers. The Forecast is available to the public on the Economic Impact and Diversity's web site.

- Reviewed Departmental procurement requests valued in excess of $3 million to ensure equitable contracting opportunities for small businesses to compete for the Department's acquisitions.

- Co-sponsored, coordinated and participated in 10 outreach efforts with women-owned and small, disadvantaged businesses at Federal, State, and local government seminars and private-sector expositions, workshops and technology fairs.

- Completed and submitted the "Report to Congress on Small Business Programs" for fiscal years 1994, 1995, 1996, and 1997

- Solicited participation of management and operating contractors into the DOE 8(a) Pilot Program, resulting in 2 new recruitments (Mason & Hangar Corporation, Albuquerque and TRW Environmental Safety Systems, Nevada.)

- Clarified rules of 8(a) Pilot Program to managers Department-wide. Increased award obligations from $119 million in FY 1997 to $142 million in FY 1998.

- Developed and launched a Department-wide women-owned small business campaign to provide outreach, marketing and training assistance.

- Initiated a DOE Headquarters Speakers Service for women-owned small business associations and organizations.

- Planned and co-hosted a DOE Headquarters women-owned small business marketing fair.

- Developed and coordinated the Secretary's Small and Disadvantaged Business Awards Program. Fifty-eight awards were presented in FY 1998.

- Created a "Useful Internet Addresses" list for use by the public sector.

- Provided telephone counseling to approximately 200 woman-owned small businesses

Office of Civil Rights

The Office of Civil Rights, mandated by P.L. 88-353, Title VII of the Civil Rights Act of 1964, as amended, enforces the Department's affirmative employment programs by assuring equal opportunity for all employees and applicants identifying and eliminating barriers to employment both physical and non-physical; and develops, monitors and implements an equal employment opportunity counseling, complaints, and investigations programs and leading diversity strategies for the Department. This program activity is a continuing level of effort and is based on implementing an aggressive Department-wide 10 Point Civil Rights Plan and statutory responsibilities to develop and administer Departmental policies, practices, and procedures to assure equal opportunity and to devise and integrate diversity in all workplace and business decisions.

- **Significant Accomplishments and Program Shifts**

  - Delivered timely service for formal EEO complaints by reducing the average EEO compliant processing time to 25 percent less than the allowed 180 days.

  - Delivered effective, tailored diversity training to Departmental organizations that are based upon program specific workforce data.

  - Delivered commemorative and special emphasis programs that educate and reach a greater number of the Departmental workforce.

  - Closed out 151 formal discrimination complaint cases: of which ED found no discrimination in 61 cases; found discrimination in 3 cases; completed 60 "final agency decisions"; dismissed 46, withdrew 7, and settled 34. In addition, ED completed 81 informal complaints. Currently there are 254 cases on hand.

  - Completed various Departmental Affirmative Employment Program activities and promoted shared vision of diversity throughout the Department by assuring work force diversity strategies.

Office of Employee Concerns

The Office of Employee Concerns (OEC) provides a focal point for employees to address the issues that concern them in a full, fair, and timely manner. OEC which typically handles approximately 500 environmental, health, safety and site security cases complex-wide, has adopted alternative dispute resolution (ADR) processes to facilitate the resolution of issues at the earliest possible stage. The expanded use of ADR is part of the DOE Strategic Plan. The Department's policy is that employees have the right and responsibility to report concerns relating to the environment, safety, health, security or

management of DOE operations. The OEC program activity level is based on environmental safety and health issues and possible ramp-up changes due to an increase in additional case work and functions previously handled by the Ombudsperson

- **Significant Accomplishments and Program Shifts**

  - Reduced long-standing employee concerns. Used calendar year 1996 figures as a baseline and reduced by 50% the number of open concerns in the 3-6 month category.

  - Produced the second annual "Employee Concerns Activity Report", widely used by DOE Principals and other senior management to review the number, type, and location of safety, health, environment, and site security concerns through the DOE complex.

  - Fully implemented a standard concerns tracking system Established a uniform system to retrieve necessary information regarding employee concerns from anywhere in the DOE complex within 24 hours.

  - Completed the proposed DOE Order 442.3 (to replace Order 5480.29 regarding the Department's safety and health program), and Policy Guidelines to formalize the employee concerns program. These documents will ensure common procedures and goals in the employee concerns program complex-wide

  - Mediated numerous whistleblower and equal employment opportunity (EEO) cases, reducing caseload as well as promoting the use of alternative dispute resolution processes. Specifically, out of 26 cases, 16 were successfully mediated, a 60% success rate

  - Completed and disseminated the first complex-wide employee concerns newsletter to inform employee concerns to managers, senior management, and stakeholders of significant developments in the subject area

  - Implemented a communication strategy to promote the employee concerns program by briefing the Secretary, Deputy Secretary, Field Managers, the Defense Nuclear Facilities Safety Board, DOE/Contractor counsels and participants at a whistleblower conference sponsored by American University and the Government Accountability Project.

  - Completed proposed changes to the Department's Contractor Employee Protection program, including drafting responses to the public comments received as a result of the Notice of Proposed Rulemaking.

  - Closed out a major DOE effort to identify and seek final resolution of "old whistleblower cases," i.e , cases involving employees alleging whistleblower reprisal between 1977 and 1992 for whom prior remedies were not available

Program Goal

- Ensure equitable opportunities for small, minority, and women-owned businesses to compete for contracts and subcontracts.
- Stimulate a diverse work environment that ensures full participation of all employees, and create

alliances with small and underutilized businesses and minority educational institutions.

- Uphold the Department's responsibilities to provide equal employment opportunity within the workplace.
- Implement the Department's whistleblower reform initiative - Continue support for the Employee Concerns Program to streamline the Department's resolution process and investigate reports of reprisals.

Program Objectives

- *Promote the Growth of Business Enterprises* — Support economic incentives for small and disadvantaged, women-owned and minority businesses through focused linkages with government-funded programs, such as the Small Business Administration and the Small Business Innovative Research Programs, and facilitate long-term investments.
- *Confirm the Department's Commitment for Excellence, Fairness and Results* — Integrate diversity in all workplace and business decisions, specifically as it relates to small business development, economic development, community outreach and involvement, educational programs and workforce opportunities.
- *Contribute to the Department's Commitment to a Policy of "Zero Tolerance"* — Implement guidance and policy, and investigate cases of reprisal against employees who raise environmental, health and safety, security and human resources issues. Implement the Department's Equal Employment Opportunity and Diversity Program Guidelines Guidelines elaborate on policies, procedures and responsibilities for the various civil rights and diversity programs.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits	3,554	3,676	3,991	+315	+8.60%
Travel	86	116	116	0	+0.0%
Support Services	0	0	0	0	+0.0%
Other Related Expenses	713	908	939	+31	-3.4%
Total, Economic Impact and Diversity	4,353	4,700	5,046	+346	+7.40%
Full Time Equivalents	40	43	42	-1	-2.30%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Salary and Benefits provide funding for full-time permanent and other than full-time permanent employees in the following classes: salaries and wages, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive Service and other performance awards, payments to funds for the benefit of employees, workman's compensation, and buyout compensation. A funding level of $3,991,000 will be needed to maintain 42 full-time equivalent staff positions (13 FTEs will implement the Minority Economic Impact Programs; 8 FTEs will provide Small and Disadvantaged Business Utilization support activities; 3 FTEs will fulfill whistle blower reform initiatives; and 18 will support Civil Rights functions).	3,554	3,676	3,991
Travel			
Travel provides funding in the amount of $116,000 to perform site visits regarding Research Program activities, minority educational institution assistance program activities; conduct employee discrimination complaint investigations; meet with minority business enterprise communities and financial institutions; provide support on diversity-related trips; sponsor the small and disadvantaged business management and technical assistance outreach activities; and to investigate unsafe and unhealthy whistleblower reports from field office employees.	86	116	116

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Other Related Expenses total funding of $939,000 of which $198,000 which will be used for investigating and reviewing employee discrimination complaint cases; sponsoring small and disadvantaged business exhibits, conference materials and other outreach activities; and implementing training and preparing fact-finding reports for whistle blower reform initiatives. $741,000 provides funding for the Working Capital Fund which supports utilities, telephone, rent, supplies, equipment, printing, graphics, copying, postage, etc.	713	908	936
Total, Program Direction	4,353	4,700	5,046

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs. FY 2000 ($000)
Salaries and Benefits	
■ The increase is the result of a decrease of one FTE offset by an increase for health insurance premiums, the full effect of the FY 1999 pay raise, and the partial effect of the FY 2000 pay raise.	+315
Other Related Expenses	
■ Working Capital Fund: The increase is the result of small increases expected in the following business lines: rent, supplies, equipment and printing and graphics.	+31
Total, Funding Change, Economic Impact and Diversity	+346

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Office of Civil Rights	120	145	145	0	0.0%
Office of Minority Economic Impact	5	15	15	0	0.0%
Office of Small & Disadvantaged Business	10	15	15	0	0.0%
Office of Employee Concerns	15	23	23	0	0.0%
Subtotal, Other Related Expenses	150	198	198	0	0.0%
Working Capital Fund	563	710	741	+31	4.40%
Total, Other Related Expenses	713	908	939	+31	3.4%

Minority Economic Impact Program Support

Program Mission

The Office of Economic Impact and Diversity (ED) is mandated by various legislation and Executive Orders to advise the Secretary of Energy on the impacts of energy policies, programs, regulations, and other Departmental actions on under-represented communities, minority educational institutions, and small and women-owned business enterprises. ED's Program Support dollars are used for the functions of the Minority Economic Impact (MI) Programs The mandate requires that MI. a) conducts a SocioEconomic Research and Analysis Program to develop and assess energy consumption data and integrate the data with the National Energy Modeling System to provide equity determinations and other policy-related analyses and economic assessments as specified in P.L. 95-619 Section 211; b) provides Management and Technical Assistance Programs to support minority educational activities focused at various levels of the educational pipeline and provide technical and scientific educational capabilities; and c) provides technical training, financial assistance, and small business assistance programs to enhance economic development capabilities among under represented population segments. To augment program assistance efforts, the Minority Energy Information Clearinghouse serves as a centralized repository and dissemination point and is responsible for the design and maintenance of web sites for the ED organization. In addition, coordination and implementation of the Department's environmental justice activities, as required by Executive Order 12898, continue to be implemented within ED.

Program Goal

The Office devises and leads multi-faceted programs and activities as it recognizes the fact that our Nation's ability to compete in a global economy depends on the development of our national resources among all segments of the population. The goals and objectives of ED are focused to contribute to our Nation's energy security objectives, economic prosperity, and equity determinations in energy policy decision-making. Accordingly, program elements include:

- Implement a comprehensive agency-wide scientific research and education program for the participation of minority educational institutions in Department of Energy missions and functions
- Conduct ongoing research programs to determine the effects (including the socioeconomic and environmental effects) of national energy programs, policies, and regulations of the Department on minorities.
- Bolster and develop effective financial business incentives and initiatives to encourage minority financial institutions to link with business enterprises in facilitating long-term economic development.
- Sustain focused management and technical assistance programs with educators, to encourage youths to study in the diverse area of energy related curriculums and technologies.

- Ensure that the Department is effectively addressing the provisions of Executive Order 12898 and that environmental justice strategies are being implemented in an effective manner.
- Provide management and technical assistance to minority business enterprises to assist their communities with economic development efforts.

Program Objectives

- *Contribute to Our Nation's Energy Security and Industrial Competitiveness* — Design initiatives for scientific training and research programs in the mathematics and science disciplines; support the development of research and educational infrastructure at Historically Black Colleges and Universities (HBCUs) and minority educational institutions; establish synergistic linkages with industry and the national energy laboratories which will increase the technical capabilities of the labor force in the energy industry and improve the current critical deficient levels
- *Enhance our Nation's Minority Educational Resources* — Support the research and educational infrastructure at secondary and post secondary educational institutions; invest in human resources at all levels of the educational curriculum through improved scientific training and research experiences in mathematics, science, and engineering for both teachers and students, and utilize the resources of Federal and private sector laboratories and energy technology industries.
- *Enhance our Nation's Energy Resources and Environmental Quality* — Continue to support the Department's National Energy Strategy by developing and implementing effective methods of determining the distribution and employment effects associated with related energy policies and programs of the Department among various population segments. Improve the analytical capability to identify cost-effective efficiency increases in various energy use sectors and also to incorporate equity issues into energy and environmental policy decisionmaking. Identify, develop, and implement programs and policy options to soften adverse impacts of energy and environmental policies, programs, and regulations on various population segments. Ensure that the Department is effectively implementing environmental justice strategies to address Executive Order 12898 on environmental justice and addressing the issues of our stakeholders.

Performance Measures

- Increase funding to Minority Institutions by 5 percent over FY 1999
- Provide two technical assistance seminars for disadvantaged businesses to improve their performance in the energy sector of the economy on a regional basis.
- Publish, in the Code of Federal Regulations, the DOE Mentor-Protègè Program.
- Enhance America's science workforce by partnering with the Department to ensure that minority serving institutions are afforded and take advantage of the Federal research, development, education and equipment opportunities for which they are eligible and increase their awards by 5 percent over FY 1998.
- Commit to specific procurement strategies that will increase the participation of women-owned small businesses in the Federal marketplace through a Memorandum of Understanding with the Small Business Administration.
- Provide expanded access to information on health related risks from operating our facilities to ensure that minority low-income populations, which may be disproportionately adversely impacted by DOE facilities, understand the Department's environmental justice goals and strategies.
- Implement the environmental justice philosophy into DOE's operational activities by a) achieving at least 15 percent increased level of community interaction at DOE's public meetings; b) developing specific criteria for evaluating effective implementation of environmental justice principles of DOE's M&O Contractors, and c) achieving at least 10 percent increased clean-up of hazardous wastes in communities impacted by DOE's operations.

Significant Accomplishments and Program Shifts

Office of Minority Economic Impact

- **Socioeconomic Research and Analysis Program (SERAP)**

  - Analytical work at the disaggregate level will be developed to facilitate effective energy policy decision-making regarding the impact of the recent restructuring of the electric utility industry and also to focus on economic development issues regarding specific regions and different population groups.

  - Analytical tools, such as the socioeconomic data bank, will be updated and augmented to reconstitute energy consumption and expenditure details at the household level and by Census regions. This will facilitate more comprehensive forecasts of the distributive impact of energy policies, programs, and activities on different segments of the population and also address the equity issue in energy policy determinations.

  - Department of Energy's (DOE) Environmental Justice Program – Publication and dissemination of the Department of Energy's *"Subsistence and Environmental Health Newsletter"* will be

continued to address the risk communication prototype program included in DOE's Environmental Justice Strategy, dated April 1995. Specific focus will be on a) the severity of health problems associated with the consumption of contaminated fish and wildlife by some ethnic populations, b) the development of a "Web-based Resource" to address issues relating to Executive Order 12898, which focuses on environmental justice, and c) addressing DOE's strategic goal of environmental quality

Management and Technical Assistance Program: Minority Education

- Convene two meetings per year with educational institution presidents and interested community leaders to provide opportunities for collaboration in economic development activities.

- Implement at least one new interagency agreement between diverse educational institutions, other Federal agencies, and the energy industry for the purpose of establishing one new high technology research and development center at one of these institutions.

- Conduct at least two opportunity workshops with representatives from minority educational institutions to encourage submission of proposals within specific DOE program areas

- Facilitate collaborative research and development efforts between educational institutions and the Department's national laboratories by sharing facilities and human resources.

- Continue the Minority Technical Education Program, emphasizing community colleges' needs to develop curricula with infrastructure support and promote partnerships with industry and national laboratories as a means of promoting economic growth in surrounding communities. In addition, increased opportunities will be provided for successful bridge programs from two-year and four-year institutions leading to careers with energy-related industries

- Expand the Southeastern Consortium for Minorities in Engineering (SECME) program to include partnerships with other pre-college programs aimed at improving teacher training and science curricula materials.

- Facilitate efforts to expand participation of high schools in the Department's Regional and National Science Bowl competitions.

- Convene an annual meeting of minority educational institution presidents with the Secretary of Energy to discuss areas of interest for participation of their institutions

Management and Technical Assistance Program: Business and Community Development

- Demonstrate DOE as a model organization that fosters and embraces diversity by committing to equity, inclusion, opportunity, accommodation, and non-discrimination

- Improve the work environment to increase productivity, enhance employee development and establish DOE as a place where women and minorities want to work

- Promote diversity on a continuous basis in ways which are visible to the entire work force.

- Promote focused, multi-stakeholder, and self-sustaining institutional structures for minority communities

- Assess the status quo of minority communities to analyze and evaluate the lessons learned over the past few decades and speculate about future direction

- Facilitate the creation of partnerships at local, regional, and national levels among government, business, industry, and academia for the implementation and execution of activities, programs, initiatives and projects.

- Foster more successful business opportunities, economic development, community development and enhance energy efficiency and innovative technology deployment with minority businesses.

- Promote international business partnerships through the Africa Growth and Opportunity Act and the North American Free Trade Agreement to build minority economic development while exporting US technology.

- Facilitate participation and support of Native American-owned and tribal controlled businesses in contract opportunities with the Department, and Historically Under-represented Business (HUB) Zones.

- Provide outreach, training, and customer service initiatives designed to encourage minority owned firms to actively participate in electronic commerce

Management and Technical Assistance Program: Bank Deposit Financial Assistance

- Develop strategies which will be utilized in encouraging joint ventures with minority financial institutions and business communities.

- Recommend to minority financial institutions that they increase their debt capital by providing loans to minority owned businesses in order to increase services to secondary business markets.

- Identify eligible minority financial institutions to increase diversity of Trustee Banks

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Minority Economic Impact	1,650	1,700	0	1,700	1,700
Total, Minority Economic Impact .	1,650	1,700	0	1,700	1,700

Public Law Authorizations:

P.L. 95-619, "National Energy Conservation Policy Act" (NECPA - 1978) Section 641 of (42 U.S.C. 7141)
P.L. 95-507, 92 Stat. 770, Small & Disadvantaged Business Utilization
P.L. 88-351, Title VII of the Civil Rights Act of 1964, as amended

Executive Orders:

12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"
12876 "Historically Black Colleges and Universities"
12900 "Educational Excellence for Hispanic Americans"
13021 "Tribal Colleges and Universities"

Funding by Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	125	0	0	0	0.0%
Sandia National Laboratory	70	150	150	0	0.0%
Golden Field Office	150	150	150	0	0.0%
Total, Albuquerque Operations	345	300	300	0	0.0%
Chicago Operations Office					
Argonne National Laboratory	150	150	150	0	0.0%
Total, Chicago Operations Office	150	150	150	0	0.0%
Oakland Operations Office	400	215	215	0	0.0%
Total, Oakland Operations Office	400	215	215	0	0.0%
Oak Ridge Operations Office	55	0	0	0	0.0%
Oak Ridge National Laboratory	0	270	270	0	0.0%
Office of Scientific & Technical Information.	0	4	4	0	0.0%
Total, Oak Ridge Operations Office	55	274	274	0	0.0%
Washington Headquarters	700	761	761	0	0.0%
Total, Minority Economic Impact	1,650	1,700	1,700	0	0.0%

Site Description

Sandia National Laboratories

Sandia National Laboratories has a long history of successful partnerships with the private sector and academia, whether through relatively simply technical assistance arrangements with small business or collaborative technology development with large companies or a consortium. To make its resources more easily available to small businesses, Sandia has established a Small Business Initiative with user facility agreements to allow small business technical personnel to gain access to many of Sandia's facilities and equipment. Sandia's Energy and Environment organization supports DOE customers, other government agencies, and U.S. industry with effective science and engineering solutions that improve our national security and the quality of our environment. Sandia National Laboratories was one of the first to implement a Strategic Plan for Diversity and outreach to the neighboring community.

Argonne National Laboratory

Argonne National Laboratory, located in southwest Chicago, Illinois, is the Nation's first national laboratory, chartered in 1946. Its multi-disciplinary workforce is optimized for productivity and its management is based on objective management of performance. During the past 15 years, DOE's SocioEconomic Research and Analysis Program (SERAP) has utilized a multi-disciplinary team at Argonne to establish a unique SocioEconomic data bank, by population categories, and to generate numerous unparalleled energy policy assessment models which have provided input into Departmental decision making regarding energy policies and use patterns, energy policy impacts, and the overall issue of equity and energy policy. This information for the SERAP has been generated into PC software, in the majority of cases, to enable DOE to share the models and other information with other energy regulators, such as public utilities commissions and other energy industry organizations and congressional staff members. The information has also been disseminated to our stakeholders through DOE's National Information Clearinghouse. The data bank incorporates information from the Energy Information Administration's periodic surveys and numerous other major energy-related relevant data bases. The unique level of detail which this data bank continues to provide for the SERAP has enabled DOE to base its energy policy decisions on a disaggregate level of detail rather than at the national level. The program is mandated by P.L. 95-619, Section 211(a)(b)(c) to advise the Secretary on the effects of energy policies and regulations on various population groups.

Oakland Operations Office

The Oakland Operations Office (OAK), located in Oakland, California, is one of several operations offices nationwide dedicated to achieving U.S. Department of Energy goals through quality programs and cost-effective business management OAK began as a small Atomic Energy Commission area office to coordinate the "Big Science" programs at Lawrence Berkeley Laboratory. As industry and new laboratories with diverse interests became established, OAK grew, becoming responsible for more contracts, nationwide programs, grants and management serving key Headquarters (HQ) customers. OAK serves the public by executing programs, performing contract management, and conducting operational oversight of National Laboratories, research and development contractors and grantees in support of Department of Energy requirements and priorities. OAK operates a cost-effective matrix support organization while servicing HQ customers OAK's functions include integrating and coordinating HQ funding, program direction, functional policy direction, and guidance through the Financial Assistance Center.

The Office of Economic Impact and Diversity (ED) is one of OAK's key HQ customers Oakland's financial Assistance Center is one of the Department's Center of Excellence, with the awarding and administration of numerous grants annually In addition, OAK has significant experience in managing nationwide programs and in providing technical assistance to various educational institutions. OAK has provided program management and grant administration services to ED for over 17 years. In 1987, the Minority Honors Training and Industrial Assistance Program (Honors) was established by ED. OAK assisted in developing and competing the program nationwide, and continues to award and administer the program The program was restructured by ED in 1993, with OAK's assistance, was competed nationwide, and renamed the Minority Technical Education Program (MTEP). As a result of nationwide competition, OAK assisted with the awarding of eight grants for this ED Program and is currently

managing the administration of the grants. The goal of MTEP is to enhance minority post-secondary two-year educational institutions capacity to increase the number of minorities in mathematics, computer sciences, life sciences or engineering careers, and to strengthen the quantity and quality of energy-related technical and academic curricula.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL), based in Oak Ridge, Tennessee, is responsible for major DOE programs in energy research and development, in environmental management, biomedical and environmental sciences and technology, and numerous other areas. The staff at ORNL reflects a multi-discipline team of experts with an unceasing focus on understanding and assisting stakeholders. ORNL also collaborates with staff at the University of Tennessee. In addition, the staff also collaborates with the National Center for Environmental Decision-Making Research, which is funded by the National Science Foundation. ORNL staff assist this Office with the development of a tri-annual DOE subsistence and Environmental Health Newsletter and a related web site; a major component of a risk communication prototype program to address the severity of the problems associated with consuming contaminated fish and wildlife by some ethnic populations. This program was included in DOE's Environmental Justice Strategy for addressing Executive Order 12898 on Environmental Justice. The collaborative efforts in place at ORNL has heightened the quality and validity of the Newsletter articles which provide very focused information and a special "Readers' forum" for our readers and stakeholders to have their perspectives and information on relevant issues included in the Newsletter. Also included are activities of some States that are related to links between subsistence patterns and environmental health. Project-specific stories, participatory research involving community members and work initiated on pueblos, and urban subsistence and environmental health issues are also addressed.

The Oak Ridge National Laboratory (ORNL) is a multi-program science and technology laboratory that conducts basic and applied research and development to create scientific knowledge and technological solutions that strengthen the Nation's leadership in key areas of science, increase the availability of clean, abundant energy; restore and protect the environment and contribute to national security. ORNL collaborates with industry, universities and other Federal laboratories to pursue the Department's missions, and strives to increase awareness of cooperative research and technical assistance opportunities available for small and minority businesses. As the only national laboratory in the Southeastern U.S., ED places a strong emphasis on building collaborative relationships for businesses and minority educational institutions in this region.

Minority Economic Impact Program Support

Mission Supporting Goals and Objectives

SocioEconomic Research and Analysis Program (SERAP)

The SocioEconomic Research and Analysis Program is mandated by P.L. 95-619. In carrying out this mandate, the Department recognizes the fact that our Nation's ability to compete in a global economy depends on the development of our national resources among all segments of the population. This program will continue a minimum level of effort to develop and enhance the analytical tools and software to a) provide a credible quantitative framework for long-term analysis of energy environmental issues; b) assist the Department in building a consensus on energy issues; c) assess the impacts of energy programs, policies, legislative and regulatory proposals; d) establish innovative methods by which massive energy and SocioEconomic database systems can be integrated for long-term analyses and forecasting of energy and environmental data and other information; and e) develop a distributional analysis module for the National Energy Modeling System for impact decisions by geographic regions, low-income groups, and Native American Tribal governments. The Research and Environmental Justice Program efforts relate to the strategic goals of energy resources and addresses a continuing level of effort, as required by its legislative mandate and overall energy policy needs.

Management and Technical Assistance (M&TA)

The Management and Technical Assistance (M&TA) provides technical assistance to minority educational institutions and minority business enterprises to enable them to participate in market research, planning, economic and business analysis, and program and contract opportunities within the Department. To augment these efforts, the Minority Information Clearinghouse serves as a centralized repository and dissemination point. Enhance minority participation in the energy technology industry by supporting the research and education infrastructure at minority educational institutions. Invest in human resources at all levels of the educational curriculum through improved scientific training and research experiences in mathematics and sciences, for both students and teachers. Incorporate the technical resources of Federal and private sector laboratories and energy technology industries to assist under-represented students to pursue careers in mathematics and sciences. Encourage innovation and business entrepreneurship which will improve the level of competition in the energy arena. This program is used to develop effective mechanisms to. a) encourage and promote under represented population groups to pursue scientific and technical energy-related training at all levels of the education pipeline; and b) assert the support for small businesses by assisting them through developing a climate that is conducive to integrating their capabilities with the Department's needs.

Financial Assistance Program

The Financial Assistance Program is mandated by P.L. 95-619, to provide short-term deposits of Federal funds in minority-owned financial institutions. Under this program, non-appropriated funds obtained through consent decrees in the Economic Regulatory Administration's Petroleum Violation Escrow

Account are deposited in short-term certificates of deposit in minority financial institutions to be used as the additional capital for loans and investments in their respective minority communities. The continued level of funding is essential in order to provide eligible participants with available working capital to stimulate economic development and growth for minority business development in inner-cities.

FY 1998 and FY 1999 Significant Accomplishments

- **SocioEconomic Research and Analysis Program (SERAP)**

  - Under the sponsorship of the Baltimore Urban League, two presentations were made by members of the SocioEconomic Research and Analysis (SERAP) team. Attendees at each of the presentations included elected officials, public service commissioners, public utilities executives, educators, and members of community based organizations. The presentations were made at: a) the Minority Energy Technical Assistance Program in Tucson, Arizona. Discussions focused on "SocioEconomic considerations for electric Industry Restructuring," and other issues such as: market power, uncertainty and reliability, stranded costs, stranded benefits (low income assistance and environmental protection), aggregation, and relevant consumer information. b) The presentation at the Minority Energy Technical Assistance Program in Denver, at the Colorado Urban League focused on the overall mission of the SERAP, the legislative mandate and other rationale for the program, the objective of developing disaggregated analysis of the impact of energy policy, characterizing energy use patterns of energy use by minority households in different regions of the U.S. and the impact on the equity issue and the energy expenditure share of income by population group and Census regions and the impact of situational factors on energy consumption outcomes.

  - Gave presentation at the National Center for Environmental Decision-making Research (sponsored by the National Academy of Sciences). Conducted workshop on "Challenges of Environmental Justice Issues" at the national, regional, and local levels. Interacted with Federal, Tribal and State governments, creating an organizational structure for effective interactions; and developed core performance measures.

  - Developed and co-authored with DOE's Office of Environment, Safety and Health a guidance document for DOE employees involved with environmental safety health activities on "Incorporating Environmental Justice Principles into the Comprehensive Environmental Response Compensation Liabilities Act Process."

  - Initiated the planning and development and editing of the 3rd Volume of "*Subsistence and Environmental Health*", a U.S. Department of Energy Environmental Justice Newsletter, Fall 1998 issue. Articles focused on issues such as tradition, culture, and food safety, mercury dose reconstruction, food preservation and health, health effects of consuming fish from contaminated urban waters, in addition to more detail on fish consumption and health, such as the dangers of bioaccumulation. Approximately 3500 copies were printed, with some DOE offices requesting bulks of 100 copies for use at relevant conferences.

Management and Technical Assistance Program

- Continued the Minority Technical Education Program with 8 community colleges to provide bridge programs and technical training for science and technology students

- Continued the SECME (formerly Science and Engineering Consortium for Minorities in Engineering) program with 26 elementary, middle, and high schools in the District of Columbia and 13 middle and high schools in Prince George's County public schools, resulting in 12 high school seniors entering college to pursue science, engineering, mathematics, or technology degrees.

- Coordinated the Department's National Historically Black Colleges and Universities Program, which included a showcase of 15 HBCU exhibits of Departmental partnerships and presentation of a grant to the National Association for Equal Opportunity in Higher Education (NAFEO) to develop a science resume for HBCU students. Awarded a grant of $140,000 to NAFEO to develop a science resume system to give graduate schools access to HBCU science and technology graduate students' resumes for greater opportunities for choice graduate school admissions and financial assistance.

- Coordinated the first District of Columbia Science Bowl with 13 District of Columbia public high schools and 1 private school.

- Sponsored a technical assistance workshop of 150 participants from 56 HBCUs during the annual conference of the National Alliance of HBCU Sponsored Program Administrators at Norfolk State University, Norfolk, Virginia.

- Partnered with the 100 Black Men of Los Angeles Education Committee to provide 23 scholarships/fellowships to high achieving minority students pursuing degrees in science, mathematics, engineering and technology degrees.

- Facilitated continued funding of the Historically Black Colleges and Universities/Minority Institutions consortium and Spelman College from the Office of Environmental Management.

- Facilitated education and building projects under the auspices of the Gore-Mbeki Bi-National Commission including expansion of a township development pilot project where U.S. government funding has complemented U.S. private sector innovation in the areas of energy efficient housing, energy small business entrepreneurship, and renewable energy training.

- Facilitated collaborative relationships with the private industry, through the International Power Institute, to study the economic, political and cultural environments in targeted developing countries in order to make appropriate technology based recommendations to provide for increased markets for U.S. technologies.

- Implemented a pilot project, CREATE 21, – Consortium for Revitalization through Advanced Technology-Based Economic Development, to assist businesses, industries and communities to adopt near-term energy efficient technologies in local communities.

- Began Phase I of a strategy that can be implemented to create more effective partnerships between minority businesses and minority educational institutions to increase and enhance entrepreneurial development for both institutions.

- Sponsored a two-month study tour for five senior members of South Africa's Department of Minerals and Energy to support South Africa in the process of rebuilding its energy sector into a key modern, market-oriented, and environmentally sensitive component of its infrastructure.

- Partnered with the Department of Justice on an interagency project in support of Native American owned businesses and interests

Financial Assistance Program

- Increased the level of funding for participating Minority Financial Institutions from $201.4 million to $213.4 million which represents a $12 0 million increase over the previous fiscal year.

- The Department of Energy placed 2,246 certificate of deposits in Minority Financial Institutions which provided an infusion of capital in the communities served by participating Minority Financial Institution in 22 deposits of $2,090

- Expanded the Bank Deposit Financial Assistance Program by increasing by six the number of minority financial institutions participating in the Department's program.

- Provided deposits to new participating Minority Financial Institutions that will increase opportunities for small and minority businesses to obtain entrepreneurial capital as well as alternative financial services.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
SocioEconomic Research and Analysis Program					
Data Development and Minority Energy Assessment Models	150	150	150	0	0.0%
Management and Technical Assistance Program					
Minority Educational Institutions Support	750	808	808	0	0.0%
Minority Business and Community Devel.	570	542	542	0	0 0%
Financial Assistance Program					
Bank Deposit Financial Assistance	180	200	200	0	0.0%
Total, Minority Economic Impact	1,650	1,700	1,700	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SocioEconomic Research and Analysis Program			
Provides funding for a quantitative framework for determining the effects of national energy policies, programs, and regulations on minorities; to provide regional socioeconomic and other information and related analysis of DOE's policies and programs, on a comparative basis; and to develop focused technical assistance relating to new energy technologies for minority businesses and minority communities	150	150	150
Management and Technical Assistance Program			
Provides funding for Minority Educational Institutions Support programs designed to broaden the participation of minorities in the Department's research, development, and demonstration and training programs through the development of improved scientific research and related capabilities at minority educational institutions.	750	808	808
Provides funding for Business and Community Development program activities which offer management and technical assistance to minority business enterprises to enhance their opportunities to participate fully in the energy programs of DOE.	570	542	542
Financial Assistance Program			
Provides funding for the Bank Deposit Financial Assistance Program which provides short-term deposits of Federal funds in minority-owned financial institutions.	180	200	200
Total, Minority Economic Impact	1,650	1,700	1,700

Contract Reform and Privatization Project Office

Mission Supporting Goals and Objectives

The Contract Reform and Privatization Office's (PC) mission is to act as the principle advisor to the Secretary in the formulation, guidance, and implementation of the Department's privatization and contract reform initiatives. The office represents the Department on privatization and contract reform matters in dealings with Congress, other Federal agencies, and various stakeholders. It participates in reviews at various stages of privatization projects including acquisition planning, budgeting, and the development of Requests for Proposal (RFP) and contracts, and has concurrence authority on all major procurement actions.

The PC will ensure that privatization and contract reform initiatives are conducted with the most effective and cost-efficient contracting systems, techniques and practices available for mission accomplishment, and will stimulate innovation in order to better manage change in departmental programs and to help ensure a proper allocation of risk in business and management strategies.

This office will work to strengthen and coordinate the policy, planning and guidance capabilities of the Department to provide an integrated management approach in privatization and contract reform projects to ensure the success of the Department's mission It will also assist in addressing and meeting the critical human resources needs across the Department to successfully implement privatization and contract reform projects In addition, the PC will provide systematic analyses of key areas of privatization and contract reform to determine whether on-going approaches should be continued, improved, or discarded.

Performance Measures

- Hire a privatization director, develop a Department-wide privatization strategy, and identify and pursue privatization opportunities.
- Establish a clearinghouse for Department-wide "lessons learned" and "best practices" that embody the work of Headquarters and Field elements, and that recognize the diversity of the Department's mission and its facilities and contractors
- Develop and conduct relevant training sessions, workshops and conferences on diverse topics, such as proper risk allocations, financial engineering, and consistent implementation of performance measures.
- Collect, categorize, analyze, and validate "best practices" of the government and private sector, and determine the most effective manner in which they can be integrated into Department operations.
- Partner in the development of protocols for the recruitment, allocation, and deployment of jobs to meet the changing needs of the Department and in successfully implementing changing contractual practices

Funding Schedule[a]

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salaries and Benefits		643	943	+300	+46.7%
Travel		175	175	0	0%
Support Services		2,130	1,830	-300	-14.1%
Other Related Expenses		252	252	0	0%
Total, Contract Reform and Privatization		3,200	3,200	0	0%
Full Time Equivalents		5	7	0	0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
The salaries and benefits reflect that this newly created office will require a small core group of full-time permanent employees. The resources listed here are based on the concept of a small office that would coordinate and facilitate privatization and contract reform activities throughout the Department. This category includes: salaries and wages, overtime pay, cash incentive awards, lump sum leave payments, Senior Executive Service and other performance awards, payments to funds for the benefit of employees, and workman's compensation.		643	943
Travel			
Travel funds finance staff travel for Department-wide activities in contract reform and privatization areas, such as advance acquisition planning, development of site management strategies, project reviews, workshops, and training.		175	175

[a]In FY 1998, funding for this program was provided within the Environmental Management program office budget. In FY 1999, the Energy and Water Development Appropriations Act, P.L. 105-245, identified separate funds for PC.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Support Services			
Support services will finance skills in key areas, such as finance engineering, risk allocation, complex legal and tax matters, and private sector project management expertise. These skills are limited within the Department. The plan recognizes the need to supplement the skills of the new Director and current staff with contract support on an as needed basis.		2,130	1,830
Other Related Expenses			
Other related expenses will finance the acquisition of goods and services that support the office mission and are not considered support services. They include working capital fund, rent, supplies, telephone service, ADP support, etc.		252	252
Total, Program Direction		3,200	3,200

Explanation of Funding Changes FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ The $300,000 increase consists of hiring 2 additional senior level employees, the partial effect of the FY 1999 pay raise, and the full effect of the FY 2000 pay raise.	+300
Support Services	
■ With an increase in federal staffing resources and skills mix, the reliance upon contractor Support Services will decrease accordingly in FY 2000.	-300
Total Funding Change, Contract Reform and Privatization	0

Support Services[a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support[b]		1,100	1,000	-100	-9.1%
Management Support[c]		700	600	-100	-14.3%
Special Studies[d]		330	230	-100	-30.3%
Total, Support Services		2,130	1,830	-300	-14.1%

Other Related Expenses[a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund		77	77	0	0%
Training of Federal Staff		75	75	0	0%
Outreach Activities		50	50	0	0%
Acquisitions		50	50	0	0%
Total, Support Services		252	252	0	0%

[a]In FY 1998, funding for this program was provided within the Environmental Management program office budget. In FY 1999, the Energy and Water Development Appropriations Act, P.L. 105-245, identified separate funds for PC.

[b]Technical Support includes support to privatization planning projects in the areas of financial engineering analysis, risk allocation, and complex legal and tax matters as they relate to negotiations of contract reform and privatization contracts in the complex.

[c]Management Support includes training and educational development in the areas of project financing, value management, risk allocation training. It also includes putting on workshops.

[d]Special Studies include tax analysis, alternative contracting methods, economic and environmental analysis, safety risk analysis, international privatization projects, and lessons learned with applicability to DOE.

Cost of Work for Others

Mission Supporting Goals and Objectives

The Cost of Work for Others (CWO) program provides funding to the Department of Energy's (DOE) multi-purpose field offices and national laboratories to finance the cost of products and services requested by non-DOE users, both foreign and domestic. The products and services provided by the Department under this program generally are not available from alternate sources and 1) are a revenue program which results from a budgeted mission of the Department; or, 2) are reimbursable work for non-federal entities where the sponsor is precluded by law from providing advance funding. The costs of the Cost of Work for Others program are offset by revenues received from the sale of products and services to our customers.

The goals for this program are continued access to the department's laboratory complex and availability of by-products for sale to these non-federal customers. The CWO program satisfies the needs of our non-federal customers. For this reason, performance evaluation for this work is the responsibility of our customers. The success of this program is indicated by the steady stream of business from the targeted groups.

A new activity added to the Cost of Work Program in FY 1997 was a portion of the Department's Foreign Research Reactor Spent Fuel Program. This program which involves the receipt and storage of foreign research reactor spent fuel is provided for in the Cost of Work Program only to the extent of revenues provided. In addition to the funding provided here, the Defense Environmental Management Appropriation includes $9,200,000 in FY 1998; $9,500,000 in FY 1999 and $9,800,000 in FY 2000 at the Savannah River site and $10,100,000 in FY 1998; $8,716,000 in FY 1999 and $7,800,000 in FY 2000 at the Idaho site, to support those activities associated with the Foreign Research Reactor Spent Fuel program which are not offset by revenues, including all costs associated with spent fuel returned from other than high income nations.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Products Sold:					
Savannah River Operations Office	4,080	4,561	5,149	+588	+12.9%
Services Performed:					
Albuquerque Operations Office	3,600	2,500	2,500	0	0.0%
Argonne National Laboratory	725	75	1,200	+1,125	+1,500.0%
Brookhaven National Laboratory	759	1,570	968	-602	-38.3%
Chicago Operations Office	100	150	150	0	0.0%
Idaho Operations Office	0	3,100	1,800	-1,300	-41.9%
Lawrence Berkeley Laboratory[a]	4,296	9,157	1,768	-7,389	-80.7%
Lawrence Livermore Laboratory[b]	6,577	3,410	3,184	-226	-6.6%
Oak Ridge Operations Office	1,781	1,386	1,515	+129	+9.3%
Oak Ridge National Laboratory	774	2,903	3,093	+190	+6.5%
Oakland Operations Office	3,300	3,000	3,000	0	0.0%
Savannah River Operations Office[c]	11,478	12,500	9,700	-2,800	-22.4%
Subtotal, Services Performed	33,390	39,751	28,878	-10,873	-27.4%
Subtotal, Cost of Work for Others	37,470	44,312	34,027	-10,285	-23.2%
Use of Prior Year Balances	0	0	-6,672	-6,672	>999
Total, Cost of Work for Others	37,470	44,312	27,355	-16,957	-38.3%

[a]FY 1998 reflects reduction of $3,000,000 in budget authority to fund spent fuel receipt, storage and management activities at Savannah River.

[b]FY 1998 reflects reduction of $1,500,000 in budget authority to fund spent fuel, receipt, storage and handling activities at Savannah River.

[c]FY 1998 reflects supplemental of $5,408,000, $4,500,000 in budget authority identified above in footnotes a and b and the use of $1,570,000 in prior year balances.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Products Sold:			
Savannah River Operations Office			
■ Support forest management and the sale of timber by the U.S. Forest Service. The funding level was derived based on the personnel costs for the 32 FTEs of the U.S. Forest Service who support the Savannah River timber management program, and the historical costs, adjusted for inflation, associated with contractual support for services, radio maintenance, reforestation activities surveying and monitoring of protected, endangered and threatened species, archeology surveys and various research studies.	4,080	4,561	5,149
Services Performed:			
Albuquerque Operations Office			
■ Provide miscellaneous services for state and local governments, such as highly specialized computer and automation support at the Sandia and Los Alamos National Laboratories and sale of utilities to the County of Los Alamos at Los Alamos National Laboratory.	3,600	2,500	2,500
Argonne National Laboratory			
■ Support research activities for state and local governments such as the support of the Chemical Stockpile Emergency Preparedness Program operated by the Alabama Emergency Management Agency. The funding level was derived based on an analysis and of the expenses for providing the specific research activities requested by the State of Alabama..	725	75	1,200
Brookhaven National Laboratory			
■ Provide for the sale of isotopes and the sale of foreign and domestic data bank sales. Continue to miscellaneous activities for state and local governments. The funding amount was estimated based on extensive historical data of the costs of producing these isotopes, data banks and miscellaneous services.	759	1,570	968

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	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Chicago Operations Office			
■ Provide certified reference materials used by the Nuclear community at the New Brunswick Laboratory. The level of funding was derived based on historical sales of certified reference materials and the costs associated with projected new sales.	100	150	150
Idaho Operations Office			
■ Receive, manage and provide interim storage of Foreign Research Reactor Spent Fuel.	0	3,100	1,800
Lawrence Berkeley Laboratory			
■ Conduct work for state and local governments and non-profit organizations including tritiation of compounds; R&D on environmental remediation; vacuum evaporation of elements on various detectors; provide high resolution scanning electron microscopy for chemical analysis of detenin for an NIH project; support NIH research on the relationship of materials used in medicine; and construction of a model to be used in sickle cell anemia research. The requested level of funding was derived using a variety of methods including: zero based budgeting, specific cost reviews with adjustments for inflation, trend analysis, and use of expert opinions in cases where an activity was not previously performed.	4,296	9,157	1,768
Lawrence Livermore Laboratory			
■ Conduct work for for state and local governments and non-profit organizations including structural inspection of dams and water contaminants for the California Dept. of Water Resources; projects supporting the California State Dept. of Transportation; research for the California State Tobacco Related Disease Program; studies on genetic defects for UC Berkeley; and measurement of samples at the Accelerator Mass Spectrometry Center at LLNL for the UC-San Francisco. The level of funding was derived based on a projection of the specific costs associated with performing the above work. These costs include: salary and benefits for lab employees, associates post doc/ graduate students, summer students, consultants, and supplemental labor; lab admin charges, subcontractors, and equipment.	6,577	3,410	3,184

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Oak Ridge Operations Office			
■ Provide miscellaneous services for state and local governments including providing treated water to the City of Oak Ridge and universities. The estimate is based on the historical operational costs adjusted for inflation of the water plant used to provide treated water to the City of Oak Ridge and analysis of the historical costs adjusted for inflation associated with providing each of the requested services as stated in the statements of work to the requesting state or local government. These costs include staff resources, supplies, materials and contractual expenses.	1,781	1,386	1,515
Oak Ridge National Laboratory			
■ Provide miscellaneous services for state and local governments including research of high temperature materials; analysis of transportation systems; magnetic fusion transportation of nuclear waste; preparation of materials for transmission electron microscopy characterization; irradiation services; and various environmental modeling, analysis and assessments. The estimate is based on an analysis of the historical costs adjusted for inflation associated with providing each of the requested services as stated in corresponding statement of work. These costs include staff resources, supplies, materials and contractual expenses required to perform the service.	774	2,903	3,093
Oakland Operations Office			
■ Support particle physics collaboration with Japan and other development efforts at the Stanford Linear Accelerator Center (SLAC). The funding level is based on the historical costs of labor, materials and services required to provide these activities.	3,300	3,000	3,000
Savannah River Operations Office			
■ Receive, manage and provide interim storage of Foreign Research Reactor Spent Fuel. The funding level was derived based on the historical transportation costs of a shipment from a country, unloading costs for a shipment, satellite tracking costs, and overland shipment support activities such as emergency preparedness training and other needs of the country or sate involved with a shipment.	11,478	12,500	9,700

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Total, Services Performed	33,390	39,751	28,878
Total, Cost of Work for Others	37,470	44,312	34,027

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs. FY 2000 ($000)
Products Sold:	
Savannah River Operations Office	
■ Increases due to the need to: conduct additional trapping to protect timber resources; surveying and monitoring of protected, endangered and threatened species; and additional archeology surveys selected for timber operations.	+588
Argonne National Laboratory	
■ Increase to initiate a new project with the Alabama Emergency Management Agency	+1,125
Brookhaven National Laboratory	
■ Decrease due to projected lower level of data bank sales and no expected projects with the New York State Dept. of Transportation	-602
Idaho Operations Office	
■ Decrease due to a fewer projected number of shipments of Foreign Research Reactor Spent Fuel to this site	-1,300
Lawrence Berkeley Laboratory	
■ Decrease is related to a transfer of biological research at the Drosophilia Center for the National Institutes of Health to Reimbursable Work	-7,389
Lawrence Livermore Laboratory	
■ Decrease due to a projected lower level of projects with the State of California and a fewer number of projects which utilize the Accelerator Mass Spectrometry Center to measure samples	-226
Oak Ridge Operations Office	
■ Increase due to inflation of costs required to provide the City of Oak Ridge with treated water	+129
Oak Ridge National Laboratory	
■ Increase due to a projected increase in the number of projects with domestic industry	+190
Savannah River Operations Office	
■ Decrease due to a fewer number of projected Foreign Research Reactor Spent Fuel shipments	-2,800
Total Funding Change, Cost of Work for Others	-10,285

Revenues Associated With Cost of Work for Others

Mission Supporting Goals and Objectives

Associated Revenues represents the full-cost recovery offset to Cost of Work for Others, the program associated with providing products and services to our customers.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Products Sold:					
Savannah River Operations Office	-7,975	-5,400	-5,800	-400	7.4%
Services Performed:					
Albuquerque Operations Office	-2,211	-3,010	-3,010	0	0.0%
Argonne National Laboratory	-278	-75	-1,200	-1,125	1,500.0%
Brookhaven National Laboratory	-261	-1,570	-968	+602	-38.3%
Chicago Operations Office	-277	-150	-150	0	0.0%
Idaho Operations Office	0	-3,100	-1,800	+1,300	-41.9%
Lawrence Berkeley Laboratory [a]	-1,719	-9,182	-1,775	+7,407	-80.7%
Lawrence Livermore Laboratory[b]	-2,524	-3,695	-3,184	+511	-13.8%
Oak Ridge Operations Office	-947	-1,437	-1,710	-273	19.0%
Oak Ridge National Laboratory	-2,209	-3,495	-3,290	+205	-5.9%
Oakland Operations Office	-2,104	-3,000	-3,000	0	0.0%
Savannah River Operations Office[c]	-12,774	-12,500	-9,700	+2,800	-22.4%
Subtotal, Services Performed	-25,304	-41,214	-29,787	+11,427	-27.7%
Total, Cost of Work for Others	-33,279	-46,614	-35,587	+11,027	-23.7%

[a]FY 1998 reflects reduction of $3,000,000 in revenues to fund spent fuel receipt, storage and management activities.

[b]FY 1998 reflects reduction of $1,500,000 in revenues to fund spent fuel receipt, storage and management activities.

[c]FY 1998 reflects revenues are from foreign countries for spent fuel receipt, storage and management activities.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Products Sold:			
Savannah River Operations Office			
■ Includes revenues received from the sale of timber..	-7,975	-5,400	-5,800
Services Performed:			
Albuquerque Operations Office			
■ Includes revenue from miscellaneous services provided for state and local governments, such as highly specialized computer and automation support at the Sandia and Los Alamos National Laboratories and sale of utilities to the County of Los Alamos at Los Alamos National Laboratory.	-2,211	-3,010	-3,010
Argonne National Laboratory			
■ Reflects revenue from research activities conducted for state and local governments such as the support of the Chemical Stockpile Emergency Preparedness Program operated by the Alabama Emergency Management Agency	-278	-75	-1,200
Brookhaven National Laboratory			
■ Includes revenue from the sale of isotopes and the sale of foreign and domestic data banks and from miscellaneous research activities provided for state and local governments.	-261	-1,570	-968
Chicago Operations Office			
■ Includes revenues from the sale of certified reference materials used by the Nuclear community at the New Brunswick Laboratory.	-277	-150	-150
Idaho Operations Office			
■ Reflects revenues received from foreign countries in return for the receipt, management and interim storage of their spent research reactor fuel.	0	-3,100	-1,800

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Lawrence Berkeley Laboratory			
■ Includes revenues received for work conducted for state and local governments and non-profit organizations including tritiation of compounds; R&D on environmental remediation; vacuum evaporation of elements on various detectors; provide high resolution scanning electron microscopy for chemical analysis of detenin for an NIH project; support NIH research on the relationship of materials used in medicine; and construction of a model to be used in sickle cell anemia research.	-1,719	-9,182	-1,775
Lawrence Livermore Laboratory			
■ Includes revenues received for work conducted for state and local governments and non-profit organizations including structural inspection of dams and water contaminants for the California Dept. Of Water Resources; projects supporting the California State Dept. Of Transportation; research for the California State Tobacco Related Disease Program; studies on genetic defects for UC Berkeley; and measurement of samples at the Accelerator Mass Spectrometry Center at LLNL for the UC-San Francisco.	-2,524	-3,695	-3,184
Oak Ridge Operations Office			
■ Reflects revenues received for miscellaneous services provided for state and local governments including providing treated water to the City of Oak Ridge and universities.	-947	-1,437	-1,710
Oak Ridge National Laboratory			
■ Reflects revenues received for miscellaneous services provided for state and local governments including research of high temperature materials; analysis of transportation systems; magnetic fusion transportation of nuclear waste; preparation of materials for transmission electron microscopy characterization; irradiation services; and various environmental modeling, analysis and assessments.	-2,209	-3,495	-3,290

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Oakland Operations Office			
■ Includes revenues from particle physics collaboration with Japan and other development efforts at the Stanford Linear Accelerator Center (SLAC).	-2,104	-3,000	-3,000
Savannah River Operations Office			
■ Reflects revenues received from foreign countries in return for the receipt, management and interim storage of their spent research reactor fuel	-12,774	-12,500	-9,700
Subtotal - Services Performed	-25,304	-41,214	-29,787
Total, Cost of Work for Others	-33,279	-46,614	-35,587

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs. FY 2000 ($000)
Products Sold:	
Savannah River Operations Office	
■ Revenues increase due to a projected increase in the value of timber sales due to higher market prices	-400
Services Performed:	
Argonne National Laboratory	
■ Revenues increase due to a new project with the Alabama Emergency Management Agency.	-1,125
Brookhaven National Laboratory	
■ Revenues decrease due to a projected lower level of data bank sales and no expected projects with the New York State Dept. of Transportation	+602
Idaho Operations Office	
■ Revenues decrease due to no projected shipments of Foreign Research Reactor Spent Fuel to this site.	+3,100
Lawrence Berkeley Laboratory	
■ Revenues decrease due to a transfer of biological research at the Drosophilia Center for the National Institutes of Health to Reimbursable Work.	+7,407
Lawrence Livermore Laboratory	
■ Revenues decrease due to a projected lower level of projects with the State of California and a fewer number of projects which utilize the Accelerator Mass Spectrometry Center to measure samples	+511
Oak Ridge Operations Office	
■ Revenues increase to reflect inflation of costs incurred to provide the City of Oak Ridge with treated water	-273
Oak Ridge National Laboratory	
■ Revenues increase is due to a projected increase in the number of projects with domestic industry	+205
Savannah Operations Office	
■ Revenues decrease reflects a fewer number of projected Foreign Research Reactor Spent Fuel shipments	+2,800
Total Funding Change, Cost of Work for Others:	+11,027

Miscellaneous Revenues

Mission Supporting Goals and Objectives

Miscellaneous Revenues are received from the sale of by-products that have no cost associated with the Departmental Administration appropriation. These items are by-products of activities funded by other on-going departmental programs and are collected as miscellaneous revenues. Included in this estimate are revenues collected from the Reimbursable Work program for added factor and depreciation.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Services Performed:					
Albuquerque Operations Office	-681	-1,000	-1,000	0	0.0%
Idaho Operations Office	-9,973	-16,000	-13,000	+3,000	-18.8%
Pittsburgh	-21,845	-23,000	-30,300	-7,300	+31.7%
Added Factor and Depreciation	-22,795	-47,916	-35,000	+12,916	-27.0%
Oak Ridge - USEC	-688	-1,000	-1,000	0	0.0%
Other Revenues	-1,614	-1,000	-1,000	0	0.0%
Total, Miscellaneous Revenues	-57,596	-89,916	-81,300	+8,616	-9.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Services Performed:			
Albuquerque Operations Office			
■ Lease of facilities (gas and electric) to utility company at the Los Alamos National Laboratory at Albuquerque.	-681	-1,000	-1,000
Idaho Operations Office			
■ Costs incurred at the Idaho Chemical Processing Plant for handling and basin storage of spent fuel cores for the Department of Navy.	-9,973	-16,000	-13,000
Pittsburgh			
■ The Department of the Navy reimburses Pittsburgh for the nuclear material burn-up while the core is in operation.	-21,845	-23,000	-30,300
Added Factor and Depreciation			
■ Added factor and depreciation charges collected from other federal agencies as well as non-federal entities for Reimbursable activity conducted by the Department in accordance with full-cost recovery policy.	-22,795	-47,916	-35,000
Oak Ridge Operations Office - USEC			
■ Lease of facilities - including Gaseous Diffusion Plants at Oak Ridge and Portsmouth - by United States Enrichment Corporation to reimburse the Department.	-688	-1,000	-1,000
Other Revenues			
■ Estimate based on current rate of collections for various miscellaneous revenues collected at all the sites.	-1,614	-1,000	-1,000
Total, Miscellaneous Revenues	-57,596	-89,916	-81,300

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 1999 vs. FY 2000 ($000)
Idaho Operations Office	
■ Revenues decrease to a lower level of expected spent fuel shipments from the Navy	+3,000
Pittsburgh	
■ Revenues increase due to the offloading of spent fuel assemblies from a number of larger Navy ships	-7,300
Added Factor and Depreciation	
■ Revenues decrease a due to an overall decrease in reimbursable work and the increase in blanket waivers of added factor and depreciation	+12,916
Total Funding Change, Cost of Work for Others:	+8,616

Inspector General

Office of Inspector General

Proposed Appropriation Language

For necessary expenses of the Office of Inspector General in carrying out the provisions of the Inspector General Act of 1978, as amended, [$29,000,000] *$30,000,000*, to remain available until expended.

Inspector General Program Direction

Mission Supporting Goals and Objectives

Program Mission

Major statutory responsibilities of the Office of Inspector General (OIG) are to detect and prevent fraud, abuse, and violations of law and to promote economy, efficiency, and effectiveness in the operations of the Department of Energy (DOE). In addition, the President and Congress have directed the OIG to assume other responsibilities, such as performing financial statement audits, intelligence oversight, and audit of the operation of the value engineering program in DOE

The OIG's goals, objectives, and performance measures follow.

Program Goals

- Conduct statutorily required audits of the Department of Energy to enhance the public's ability to rely on the Department's financial and management systems
- Conduct performance reviews, which promote the efficient and effective operation of the Department of Energy's business lines.
- Conduct investigations to promote efficient and effective Department operations and maintain the integrity of the Department of Energy's business lines by aggressively pursuing fraud, waste, and abuse.
- Conduct inquiries, which assist in fostering public confidence in the Department of Energy.

Program Objectives

- Complete Chief Financial Officers Act (CFO), Government Management Reform Act (GMRA), and other audits by established due dates.
- Identify and report significant systems' deficiencies, thereby enabling the Department to take corrective action and demonstrate improved stewardship of public resources.
- Focus performance reviews on those issues and programs having the greatest potential for the protection or recovery of public resources
- Conduct oversight, consistent with Executive Order requirements, of the Department's intelligence programs.
- Conduct investigations of allegations of violations of criminal and civil Federal law, as well as serious administrative misconduct, in order to facilitate successful prosecutions and administrative actions that maximize recovery of public resources and deter future wrongdoing.
- Maintain investigative inter-agency cooperative efforts to combat fraud, waste, and abuse.
- Make recommendations for positive change in Department program operations through the issuance of administrative reports to management resulting from investigations

- Conduct proactive investigative efforts focusing on areas most vulnerable to fraud, waste, and abuse within the Department.
- Conduct inquiries which enable the Department to hold employees and contractors accountable to the highest standards of honesty, objectivity, and integrity

Performance Measures

- Complete required financial statement audits by designated due dates in the law.
- Render an opinion annually on the Department's consolidated financial statements, system of internal controls, and compliance with laws and regulations.
- Coordinate, at least annually, with Department management and other interested parties to identify and prioritize audit opportunities each fiscal year.
- Complete at least 60 percent of audits planned for the year and replace those audits not started with more significant audits, which identify time-sensitive issues needing review
- In 90 percent of open audits, consider past audit work to determine if the Department has taken corrective action on audit recommendations.
- Complete 90 percent of all audits within 12 months to provide timely information to Department management
- Develop a strategic and annual plan for a Technology Audits unit comprised of auditors with specialized skills and training in the audit and analysis of information systems.
- Plan and conduct reviews based on assessment of risk of, or benefit to, key Department programs.
- Improve internal Offices of Audit Services and Inspections processes in order to more effectively and efficiently manage high profile, sensitive, and priority reviews
- Reduce by 5 percent the time required to complete programmatic inspections that promote more efficient and effective Department operations.
- Provide quarterly OIG intelligence oversight reports to the Intelligence Oversight Board within required time frames.
- Obtain 75 percent acceptance rate on criminal and civil cases formally presented for prosecutorial consideration.
- Obtain judicial and/or administrative action on 35 percent of all cases in open status during the fiscal year.
- Improve internal Office of Investigations processes in order to more effectively and efficiently manage high-profile, sensitive, and priority investigations.
- Ensure 25 percent of all cases open during the fiscal year are task force/joint agency investigations.
- Obtain a 90 percent management compliance rate for recommendations made in administrative reports issued to the Department during the fiscal year.
- Establish a baseline for measuring the success of previously established mechanisms for tracking and reporting on notable and major positive change to Department programs and operations that resulted from Office of Investigations administrative reports to management.

- Develop and implement comprehensive computer crimes awareness briefings throughout the Department, and represent the OIG in existing multi-agency computer crime task force initiatives aimed at the prevention and detection of computer crimes.
- Initiate a proactive investigative effort of the Department's grant program, utilizing the profile of known grant fraud "indicators."
- Decrease the average number of days to process mismanagement, integrity and abuse allegations by 5 percent, thereby assisting management through more timely resolution of complaints.
- Refer 80 percent of allegations to management within 14 days of the case being initiated after a referral decision has been made.

Significant Accomplishments and Program Shifts

FY 1998 Accomplishments

- Issued 91 audit reports with a potential dollar impact of $596,232,072, compared to 80 reports and $270,327,259 for FY 1997. These reports provided a series of recommendations designed to improve and enhance the operation of DOE.
- Met the requirements of the Chief Financial Officers (CFO) Act of 1990 and the Government Management Reform Act of 1994, which included issuing the report on the "Audit of the U.S. Department of Energy's Consolidated Financial Statements For Fiscal Year 1997," February 26, 1998. The consolidated financial statements audit is a yearly requirement which is unprecedented in its scope and resource demands on the OIG.
- Found that the Department did not effectively implement existing procedures or establish other monitoring procedures to ensure that grantees fulfill their grant obligations. As a result, many grantees did not provide final technical and/or financial reports. At the five procurement offices audited, the OIG projected that the Department had not received final deliverables on 718 inactive grants valued at about $232 million. In other cases, officials inappropriately extended performance periods so that the grant instrument would continue to be classified as active.
- Found that the Department had not resolved previously reported OIG concerns when the OIG determined that over 850 contractor employees were currently working at Headquarters at an estimated cost of $76 million. The Department did not effectively manage the use of field contractor employees assigned to Headquarters and other Federal agencies.
- Disclosed in an audit of 12 major contractors that the Department did not adjust the fee bases of the major contractors to reflect actual managerial and technical effort associated with the oversight of subcontractors As a result, major contractors were paid fees for the administration of subcontracts as well as $34 million in fees for the subcontractors' effort.
- Found that the Department generally did not dispose of low-level and low-level mixed waste as cost-effectively as possible. Most Department facilities stored large quantities of waste on-site, and disposals of low-level waste were often not cost-effective. In addition, the Department built low-level waste disposal facilities at Savannah River and Oak Ridge, at a cost of $27.1 million, even though off-site disposal would have been more cost-effective.
- Contributed audit resources to the Chief Information Officer's (CIO) review of Year 2000 (Y2K) issues. The OIG participated in scheduled compliance reviews and commented on the resulting

reports for the Savannah River Operations Office, the Nevada Operations Office, the Office of Nonproliferation and National Security, and the Office of the Chief Financial Officer. In addition, the OIG reviewed site reports for the Albuquerque and Richland Operations Offices and discussed these reports with CIO staff.

- Opened 99 new investigations and referred 48 investigations to the Department of Justice for prosecutive action and 37 investigations to DOE management for positive change. Investigative results include: 10 indictments; 10 convictions; 25 debarments/suspensions; over $3 million in fines, settlements, and recoveries; 101 positive recommendations to management; and 16 administrative disciplinary actions.
- Opened 22 task force/joint agency investigations involving major program areas, including environmental, procurement, grant, and other sensitive case activities.
- Discovered that two supervisory employees of a Department subcontractor performing a demolition project had stolen copper and sold it to a metals dealer for over $25,000 in cash. OIG agents recovered stolen copper valued at over $44,000 along with the $25,000 in cash. Both employees pleaded guilty, were sentenced and fined, and were debarred for three years. The investigation also identified deficiencies in the Department's contractor safeguards and property accountability system The Department took several corrective actions.
- Conducted an investigation as a result of a company voluntarily notifying the OIG that it had mischarged time on an Energy Information Administration contract and other Government contracts with several agencies. The company disclosed approximately $25,000 in questionable charges. The mischarging involved at least one company employee who was terminated and who then filed a Qui Tam suit under the False Claims Act asserting that a company supervisor had directed the mischarging An OIG investigation confirmed the time mischarging and revealed additional time mischarging by the company supervisor with other employees. The company entered into a $425,000 civil settlement agreement on the Qui Tam.
- Conducted an investigation that determined that a contractor employee (buyer) made unauthorized modifications to a vendor's purchase orders in return for kickbacks. The vendor received an overpayment of $153,115 The buyer and a vendor official pled guilty, were both ordered to pay over $111,000 in restitution, and were sentenced. The vendor company also agreed to pay $29,000 to settle a Civil False Claims Act action The vendor company and two owners of the vendor company were debarred from Government contracting for 3 years.
- Issued 20 inspection reports, and management implemented 58 inspections recommendations to improve operations of the Department. Resolved 42 percent of the existing caseload of alleged reprisal against contractor employees
- Reported quarterly to the Intelligence Oversight Board, as required by Executive Order 12863, "President's Foreign Intelligence Advisory Board," and continued oversight of the Department's intelligence activities in accordance with Executive Order 12333, "United States Intelligence Activities."
- Reviewed and analyzed complaints received by the OIG regarding possible fraud, waste, abuse, and mismanagement to determine the appropriate course of action. In addition to initiating audits, investigations, and inspections regarding certain of these complaints, the OIG referred 207 allegations to DOE management and other governmental agencies for appropriate action. Improvements

resulting from these referrals included enhanced controls over the use of government credit cards and property disposal. In addition, management took four personnel actions on referred matters.

- Participated in an interagency assessment of the Internal Revenue Service (IRS) Inspection Service. The report identified opportunities to enhance the effectiveness of the Inspection Service, particularly in the areas of independence, public reporting of both audit results and accounting for investigative results, and the process of managing complaints in the IRS.

FY 1999/2000 Planned Objectives

- Meet the requirements of the Chief Financial Officers (CFO) Act of 1990 and the Government Management Reform Act (GMRA) of 1994 for audited Department financial statements. Include audit results in performance audits of the Department's primary functions and facilities.
- Focus performance reviews on those issues and programs having the greatest potential for the protection or recovery of public resources.
- Perform at least one performance review per year at major Department facilities, specifically Los Alamos, Livermore, and Berkeley Laboratories, with annual obligations of approximately $2.4 billion, in FY 1999, and at Sandia, Brookhaven, and Argonne Laboratories in FY 2000.
- Audit for economy and efficiency the Department's efforts in work force restructuring and economic development, environmental programs, the implementation of performance based contracting, and realignment initiatives (including streamlining organizational structure and flow).
- In FY 1999 develop a strategic and annual plan for, and begin development of, a Technology Audits unit comprised of auditors with specialized skills and training in the audit and analysis of information systems. In FY 2000 continue to develop and equip the unit and achieve full implementation.
- Conduct investigations of allegations of violations of criminal and civil Federal law, as well as serious administrative misconduct, in order to facilitate successful prosecutions and administrative actions that maximize recovery of public resources and deter future wrongdoing.
- Maintain investigative inter-agency cooperative efforts to combat fraud, waste, and abuse.
- Make recommendations for positive change in Department program operations through the issuance of administrative reports to management resulting from investigations.
- Conduct proactive investigative efforts focusing on areas most vulnerable to fraud, waste, and abuse within the Department.
- In FY 1999 begin development of a computer crimes unit comprised of Federal agents who possess the specialized skills necessary to proactively and reactively investigate the highly complex computer crimes within the Department. In FY 2000 continue to develop and equip the unit, develop and implement comprehensive computer crimes awareness briefings throughout the Department, and represent the OIG in existing multi-agency computer crime task force initiatives aimed at the prevention and detection of computer crimes.
- In FY 1999 establish a methodological profile of known grant fraud "indicators" for use in identifying areas of vulnerability within the Department's grant program, utilizing data from previously successful cases In FY 2000 use the profile to initiate proactive investigations of the grant program.

- Inspect allegations of waste or mismanagement that have high visibility with Department senior managers, Congress and the public, and continue to review management systems issues that are identified during administrative allegation reviews.
- Establish a multidisciplinary unit capable of quickly responding to sensitive issues or allegations involving high visibility/critical programs or the integrity of senior Departmental officials.
- Manage the system by which Hotline allegations are referred to Department management or other agencies for appropriate action.
- Report quarterly to the Intelligence Oversight Board, as required by Executive Order 12863, "President's Foreign Intelligence Advisory Board," and continue oversight of the Department's intelligence activities in accordance with Executive Order 12333, "United States Intelligence Activities"
- Conduct reviews of the Department's security activities.

Program Shifts

- The OIG is a revenue-positive, "level of effort" organization which, during FY 1998, identified attainable economies and efficiencies which have provided a positive dollar impact of approximately $4.4 million per audit employee per year. Thus, funding at the FY 2000 requested level should result in significant returns to the taxpayers.
- Numerous supplemental requirements have been imposed on the OIG in recent years, reducing the OIG's discretion to pursue some missions under the Inspector General Act of 1978, as amended. For example:
  - The Chief Financial Officers Act of 1990 and Government Management Reform Act of 1994 require audit of the Department's financial statements;
  - Executive Order 12863, "President's Foreign Intelligence Advisory Board," requires at least quarterly and "as necessary or appropriate" reporting to the Intelligence Oversight Board;
  - Appropriations report language creating the Department's Working Capital Fund requires an annual OIG audit of the Fund;
  - OMB Circular 131 requires the OIG to audit the Department's value engineering program;
  - The Intelligence Community Whistleblower Protection Act of 1998 requires the OIG to review complaints filed by intelligence community complainants, and to communicate with Congress, the Secretary, and the complainants regarding such concerns.
- This trend of placing additional mandates on the OIG appears to be continuing. For example, Congress has been considering proposed amendments to the Government Performance and Results Act, which will require extensive OIG review of Department performance plans and reports.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Washington - HQ					
Salaries and Benefits	3,786	4,039	4,160	121	3.0%
Travel	200	226	227	1	0.4%
Support Services	334	434	466	32	7.4%
Other Related Expenses	866	766	855	89	11.6%
Total, Washington - HQ	5,186	5,465	5,708	243	4.4%
Full Time Equivalents	43	47	46	-1	-2.1%
Field Services					
Salaries and Benefits	2,681	2,924	2,984	60	2.1%
Travel	142	163	164	1	0.6%
Support Services	237	314	335	21	6.7%
Other Related Expenses	614	553	615	62	11.2%
Total, Field Services	3,674	3,954	4,098	144	3.6%
Full Time Equivalents	31	34	33	-1	-2.9%
Germantown					
Salaries and Benefits	3,391	3,612	3,707	95	2.6%
Travel	179	202	204	2	1.0%
Support Services	300	388	416	28	7.2%
Other Related Expenses	776	684	765	81	11.8%
Total, Germantown	4,646	4,886	5,092	206	4.2%
Full Time Equivalents	39	42	41	-1	-2.4%
Chicago					
Salaries and Benefits	552	602	543	-59	-9.8%
Travel	29	34	30	-4	-11.8%
Support Services	49	65	61	-4	-6.2%
Other Related Expenses	32	19	28	9	47.4%
Total, Chicago	662	720	662	-58	-8.1%
Full Time Equivalents	6	7	6	-1	-14.3%
Cincinnati					
Salaries and Benefits	552	516	271	-245	-47.5%
Travel	29	29	15	-14	-48.3%
Support Services	49	55	31	-24	-43.6%
Other Related Expenses	32	16	14	-2	-12.5%
Total, Cincinnati	662	616	331	-285	-46.3%
Full Time Equivalents	6	6	3	-3	-50.0%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge					
Salaries and Benefits	2,129	2,150	2,351	201	9.3%
Travel	113	120	129	9	7.5%
Support Services	189	231	264	33	14.3%
Other Related Expenses	122	68	121	53	77.9%
Total, Oak Ridge	2,553	2,569	2,865	296	11.5%
Full Time Equivalents	24	25	26	1	4.0%
Princeton					
Salaries and Benefits	473	516	543	27	5.2%
Travel	25	29	30	1	3.4%
Support Services	42	55	61	6	10.9%
Other Related Expenses	27	16	28	12	75.0%
Total, Princeton	567	616	662	46	7.5%
Full Time Equivalents	5	6	6	0	0%
Savannah River					
Salaries and Benefits	1,104	1,032	904	-128	-12.4%
Travel	58	58	50	-8	-13.8%
Support Services	98	111	102	-9	-8.1%
Other Related Expenses	63	33	47	14	42.4%
Total, Savannah River	1,323	1,234	1,103	-131	-10.6%
Full Time Equivalents	13	12	10	-2	-16.7%
Pittsburgh					
Salaries and Benefits	867	860	904	44	5.1%
Travel	46	48	50	2	4.2%
Support Services	77	92	102	10	10.9%
Other Related Expenses	50	27	47	20	74.1%
Total, Pittsburgh	1,040	1,027	1,103	76	7.4%
Full Time Equivalents	10	10	10	0	0%
Albuquerque					
Salaries and Benefits	2,208	2,494	2,622	128	5.1%
Travel	117	139	144	5	3.6%
Support Services	196	268	294	26	9.7%
Other Related Expenses	127	79	135	56	70.9%
Total, Albuquerque	2,648	2,980	3,195	215	7.2%
Full Time Equivalents	25	29	29	0	0%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Denver					
Salaries and Benefits	789	946	1,085	139	14.7%
Travel	42	53	60	7	13.2%
Support Services	70	102	122	20	19.6%
Other Related Expenses	45	30	56	26	86.7%
Total, Denver	946	1,131	1,323	192	17.0%
Full Time Equivalents	9	11	12	1	9.1%
Idaho Falls					
Salaries and Benefits	710	688	723	35	5.1%
Travel	38	38	40	2	5.3%
Support Services	63	74	81	7	9.5%
Other Related Expenses	41	22	37	15	68.2%
Total, Idaho Falls	852	822	881	59	7.2%
Full Time Equivalents	8	8	8	0	0%
Las Vegas					
Salaries and Benefits	315	258	181	-77	-29.8%
Travel	17	14	10	-4	-28.6%
Support Services	28	28	20	-8	-28.6%
Other Related Expenses	18	8	9	1	12.5%
Total, Las Vegas	378	308	220	-88	-28.6%
Full Time Equivalents	4	3	2	-1	-33.3%
Livermore					
Salaries and Benefits	867	946	904	-42	-4.4%
Travel	46	53	50	-3	-5.7%
Support Services	77	102	102	0	0.0%
Other Related Expenses	50	30	47	17	56.7%
Total, Livermore	1,040	1,131	1,103	-28	-2.5%
Full Time Equivalents	10	11	10	-1	-9.1%
Los Alamos					
Salaries and Benefits	473	516	543	27	5.2%
Travel	25	29	30	1	3.4%
Support Services	42	55	61	6	10.9%
Other Related Expenses	27	16	28	12	75.0%
Total, Los Alamos	567	616	662	46	7.5%
Full Time Equivalents	5	6	6	0	0%

	(dollars in thousands, whole FTEs)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland					
Salaries and Benefits	631	774	814	40	5.2%
Travel	33	43	45	2	4.7%
Support Services	56	83	91	8	9.6%
Other Related Expenses	36	25	42	17	68.0%
Total, Richland	756	925	992	67	7.2%
Full Time Equivalents	7	9	9	0	0%
Total Inspector General					
Salaries and Benefits	21,528	22,873	23,239	366	1.6%
Travel	1,139	1,278	1,278	0	0.0%
Support Services	1,907	2,457	2,609	152	6.2%
Other Related Expenses	2,926	2,392	2,874	482	20.2%
Subtotal, Program Direction	27,500	29,000	30,000	1,000	3.4%
Use of Prior-Year Balances	0	0	0	0	0%
Total, Program Direction	27,500	29,000	30,000	1,000	3.4%
Full Time Equivalents	245	266	257	-9	-3.4%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Required for net increase in salaries and benefits due to pay raise and base salary increases. Per IG Act, the OIG employs auditors, investigators, and inspectors to detect and prevent fraud, abuse, and violations of law and to promote economy, efficiency, and effectiveness in the operations of the Department	21,528	22,873	23,239
Travel			
Travel is a critical requirement due to the nature of the OIG's work. Required to make first-hand observations of conditions and review original records at DOE sites, conduct interviews; follow up on leads, meet with subjects, witnesses, and U.S. Attorneys; appear in court; etc	1,139	1,278	1,278
Support Services			
Required primarily for ADP services, and for contractor expertise, which is needed for financial statement audits required by the CFO Act and GMRA, and for technical expertise (e g., actuaries, computer system specialists, petroleum engineers) which could not cost-effectively be maintained in-house. FY 2000 reflects a 15 percent escalation in the contract's negotiated labor rates consistent with industry practices	1,907	2,457	2,609
Other Related Expenses			
Required primarily for OIG contributions to the DOE Working Capital Fund, and for such basic support needs as ADP equipment and software, contract close-out costs, employee relocation expenses, and training, which is critical for OIG staff to maintain required levels of proficiency and comply with the IG Act by meeting GAO training requirements published in the Government Auditing Standards, 1994 Revision	2,926	2,392	2,874
Total, Program Direction	27,500	29,000	30,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
Salaries/Benefits increases due to pay raise and base salary increases, partially offset by decrease of 9 FTEs	+366
Travel	
Travel remains the same due to staffing decrease of 9 FTEs being offset by inflation and increased travel requirements for specialized work units described below	0
Support Services	
Support Services increases due primarily to 15 percent escalation in contract negotiated labor rates consistent with industry practices, partially offset by ADP savings as a result of discontinuing off-site database management systems and enhancing in-house capabilities	+152
Other Related Expenses	
Other Related Expenses increases due to the need to continue to develop and equip specialized work units to audit ADP systems and data, and to investigate computer-related crimes. These units will require Pentium II class systems with compatible hardware and peripherals, which will be utilized nationally by agents and auditors to address targeted encryption capability, data retrieval, duplication analysis, and applications that will assist in interpreting computer crime efforts targeting UNIX, LINUX, and NOVELL operating systems, vulnerability testing, application control reviews, and financial statement auditing	+482
Total Funding Change, Program Direction	+1,000

Support Services

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Management Support Services					
Consulting Services	1,200	1,750	2,012	262	15.0%
ADP Support	700	700	590	-110	-15.7%
Administrative Support Services	7	7	7	0	0%
Total, Management Support Services	1,907	2,457	2,609	152	6.2%
Use of Prior-Year Balances	0	0	0	0	0%
Total, Support Services	1,907	2,457	2,609	152	6.2%

Other Related Expenses

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Working Capital Fund	1,691	1,667	1,680	13	0.8%
Training	140	160	160	0	0%
Other [a]	1,095	565	1,034	469	83.0%
Subtotal, Other Related Expenses	2,926	2,392	2,874	482	20.2%
Use of Prior-Year Balances	0	0	0	0	0%
Total, Other Related Expenses	2,926	2,392	2,874	482	20.2%

[a] Includes ADP hardware and software, contract close-out costs, employee relocations, office supplies, etc.

Department of Energy
FY 2000 Congressional Budget Submission
Estimates For Historically Black
Colleges And Universities
Inspector General
(Dollars in Thousands)

Appropriation/Decision Unit	Name of HBCU (if known)	FY 1998 BA	FY 1999 BA	FY 2000 Request
Inspector General	None	--	--	--

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Working Capital Fund

Management and Administration

Working Capital Fund

Program Mission

This budget submission covers the activities of the Office of Management and Administration that are included in the Working Capital Fund (Fund). The Fund is a financial management tool for improving the financing and delivery of a range of common administrative services. The Fund began operation in FY 1997 with nine business lines having budgets totaling $93 million.

Program Objectives

The objectives of the Fund include:

- Ensure that program mission budgets include a fair allocation of the costs of common administrative services;
- Improve the efficiency of administrative services by providing managers with the opportunity and responsibility to make choices on the amount, priority, and, where possible, the sources of administrative services used by their programs; and
- Expand the flexibility of the Department's budget structure to permit service providers to respond to customer needs.

Significant Accomplishments and Program Shifts

The operations and policies of the Fund are overseen by a Working Capital Fund Board composed of 11 members and chaired by the Director, Management and Administration. Since it was first convened in February 1996, the Board has adopted specific pricing policies for the various business lines. Such pricing policies form the basis for the FY 2000 submission, including the revision of FY 1998 and FY 1999 estimates. For FY 2000, Electronic Services have been separately identified, whereas they had previously been included within the Building Occupancy business line. Only contractual services costs are included in the Fund; no Federal salaries or costs to administer the Fund are included.

Recent WCF accomplishments:

- the Fund staff worked with the Chief Financial Officer to codify existing WCF financial policies and procedures and to add new policies in areas recommended for attention by the Inspector General. These policies and procedures were adopted by the Board during the December 10, 1998 meeting.
- The metrics for the WCF business lines show program customers continue to respond to incentives, though with a smaller fall-off in consumption levels than in FY 1997 when the Fund was first in operation.

- Mail: Headquarters use of USPS for outgoing mail and use of internal distribution within DOE have both dropped off, and there has also been a decline in the number of mail stops and a large decrease in incoming USPS mail requiring sorting and distribution.
- Copying: While the number of separate machines has grown gradually, the number of copies generated continued to decline.
- Information Management infrastructure: WCF customers continued to reduce telephone connections, and LAN connections also decreased for the first time. However, actual usage indicators increased.
- Contract Closeout: The inventory of Headquarters contracts awaiting closeout continued to decline.

- Prices have generally remained stable except for decreases announced for mail distribution, electronic services, and local telephone calls.

Table 1 summarizes projected costs by business line and Table 2 summarizes costs by customer organization. These cost estimates represent the best projections currently available, but are subject to change based on customer decision regarding the mix, level, and source of services employed to support mission programs. In some cases, customers may choose to acquire services outside the Fund, and in other cases, customers may make tradeoffs to expand their use of Fund services in order to reduce other costs, including travel or contractual services. Furthermore, customers already appear to have made tradeoffs within the services provided through the Fund, including reduced use of paper and copying through increased reliance on electronic communication.

For each business line, three cost estimates are provided for each customer organization in Tables 3 through 14. These estimates are all based on current pricing policies and business structure decisions made by the Board.

- FY 1998 actual billing
- FY 1999 Estimate 11/98
- FY 2000 Estimate 11/98

Working Capital Fund Budget by Function

(dollars in thousands)

Table 1: Business Line	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	6,605	6,608	6,608
Networking	3,104	3,059	3,059
Desktop	1,479	1,329	1,329
Electronic Services	1,224	903	903
Building Occupancy	54,297	55,335	56,072
Supplies	2,777	2,777	2,777
Copiers	2,696	2,423	2,423
Mail Services	1,860	1,881	1,983
Printing and Graphics	3,338	3,478	3,478
Contract Closeout	449	621	621
Payroll and Personnel	1,939	2,054	2,208
Corporate Executive Information System	0	94	94
Total Working Capital Fund	79,768	80,562	81,555

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Working Capital Fund Budget by Organization

(dollars in thousands)

Table 2: Program Organization	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Office of the Secretary	891	880	929
Board of Contract Appeals	179	173	164
Bonneville Power Administration	139	136	139
Chief Financial Officer	2,400	2,391	2,362
Civilian Radioactive Waste Management	1,876	1,473	1,496
Congressional & Intergovernmental Affairs	750	747	759
Contract Reform and Privatization	2	83	84
Counterintelligence	15	580	692
Defense Programs	4,441	4,411	4,379
Economic Impact and Diversity	724	729	741
Energy Efficiency	5,646	5,763	5,816
Energy Information Administration	7,520	7,242	7,190
Environmental Management	7,218	6,720	7,085
Environment, Safety, and Health	4,474	4,479	4,763
Field Management	1,000	1,008	1,038
Fissile Materials Disposition	485	547	557
Fossil Energy	2,905	3,035	3,047
General Counsel	2,833	2,932	2,985
Hearings and Appeals	1,027	938	921
Inspector General	1,637	1,637	1,680
Intelligence	21	1,118	1,374
Management and Administration	17,022	17,111	16,937
Naval Reactors	477	490	504
Nuclear Energy	1,417	1,391	1,357
Nuclear Nonproliferation	7,308	7,499	7,509
Other PMAs	0	36	42
Policy	1,925	1,887	1,914
Public Affairs	890	874	884
Science	3,266	3,189	3,118
Secretary of Energy Advisory Board	237	246	253
Western Area Power Administration	569	390	419
Worker Transition	474	397	417
Total Working Capital Fund	79,768	80,562	81,555

Telephones

Description

The telephone business line is the telephone company for DOE Headquarters. It comprises an infrastructure connecting two main headquarters buildings and satellite buildings for internal dialing and commercial basic line service. The infrastructure includes communication networks, installed telephone processing switching equipment, and trained technical personnel. Infrastructure levels are expected to adjust over time to the planned reduction in the numbers of Headquarters facilities. Services included are adding new users, moving existing users, and changing features or functionality, and repair service for dial tone trouble calls. Commercial line service includes local, long distance, FTS, and international dialing provided and controlled through the Headquarters Information Exchange System. Specialized services include operator-assisted calls, voice mail, 3-way calling, call forwarding, and automatic ring back, among others.

Board Pricing Policy

Telephone system costs are allocated to Headquarters offices based upon three categories:

- Headquarters telephone system infrastructure costs, which are composed of: (a) the cost of the leased telecommunications circuits connecting the Headquarters buildings to the internal telephone system, including the CENTREX telephone line charges for staff located in leased facilities; (b) the cost of leased telecommunications circuits that support local, long distance and international calling; and © the cost of the technical staff who operate the Headquarters telephone switches, and install and repair the telephone wiring plant, are allocated among program organizations based on the number of active telephone lines as a per line monthly charge. Since the Fund's inception, program customers have been validating, and reducing, the number of active phone lines.
- The costs of dedicated communication circuits are be allocated to those organizations requesting installation of such lines.
- All long distance, local, and international calls are allocated to the originating telephones and thus to programs based on the actual billing information received by the Department.

Table 3 provides the estimated telephone charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 3: Telephones			
Office of the Secretary	63	59	59
Board of Contract Appeals	5	5	5
Bonneville Power Administration	12	13	13
Chief Financial Officer	232	227	227
Civilian Radioactive Waste Management	151	146	146
Congressional & Intergovernmental Affairs	51	51	51
Contract Reform and Privatization	0	3	3
Counterintelligence	0	27	27
Defense Programs	513	504	504
Economic Impact and Diversity	46	48	48
Energy Efficiency	424	452	452
Energy Information Administration	537	516	516
Environmental Management	637	616	616
Environment, Safety, and Health	425	424	424
Field Management	51	46	46
Fissile Materials Disposition	25	28	28
Fossil Energy	258	263	263
General Counsel	189	172	172
Hearings and Appeals	44	43	43
Inspector General	103	148	148
Intelligence	0	41	41
Management and Administration	1,174	1,127	1,127
Naval Reactors	139	140	140
Nuclear Energy	180	182	182
Nuclear Nonproliferation	764	744	744
Policy	155	151	151
Public Affairs	29	29	29
Science	349	352	352
Secretary of Energy Advisory Board	10	11	11
Western Area Power Administration	10	10	10
Worker Transition	29	30	30
Total Working Capital Fund	6,605	6,608	6,608

Networking

Description

Networking provides:

- Connectivity for DOE Headquarters through Local and Wide Area Networks. This connectivity provides interoperability for 86 organizational Local Area Network (LAN) segments in two main headquarters and 12 satellite buildings, and connectivity to the Headquarters mainframe systems. There are approximately 7,000 LAN connections in Headquarters.
- Access to the Internet and World Wide Web, Electronic mail, and DOECast for information sharing through the LAN backbone infrastructure.
- Interface services and communications links to field sites, other government agencies, and public/private business partners.

Board Pricing Policy

Networking charges represent infrastructure costs which are composed of: (1) the cost of the leased telecommunications circuits connecting the Headquarters metropolitan area locations (including the Germantown campus) into the network backbone system; (2) the cost of maintaining the common network infrastructure components (routers, switches, bridges, hub-mail routing servers, etc.); and (3) the cost of providing the technical staff who install and repair network connections and monitor/operate the various common network components. These charges will be allocated among program organizations based on the number of active local area network (LAN) connections as a per connection monthly charge. Since the Fund's inception, program customers have been validating the number of active LAN connections.

Table 4 provides the estimated networking charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 4: Networking			
Office of the Secretary	35	18	18
Board of Contract Appeals	0	0	0
Bonneville Power Administration	0	0	0
Chief Financial Officer	157	130	130
Civilian Radioactive Waste Management	104	106	106
Congressional & Intergovernmental Affairs	16	17	17
Contract Reform and Privatization	0	3	3
Counterintelligence	0	6	6
Defense Programs	297	294	294
Economic Impact and Diversity	27	27	27
Energy Efficiency	224	256	256
Energy Information Administration	1	2	2
Environmental Management	350	321	321
Environment, Safety, and Health	272	265	265
Field Management	39	35	35
Fissile Materials Disposition	16	16	16
Fossil Energy	123	126	126
General Counsel	102	96	96
Hearings and Appeals	34	42	42
Inspector General	78	83	83
Intelligence	0	0	0
Management and Administration	692	638	638
Naval Reactors	0	0	0
Nuclear Energy	93	94	94
Nuclear Nonproliferation	66	109	109
Policy	67	67	67
Public Affairs	16	17	17
Science	270	269	269
Secretary of Energy Advisory Board	7	7	7
Western Area Power Administration	0	0	0
Worker Transition	18	15	15
Total Working Capital Fund	3,104	3,059	3,059

Desktop Support

Description

Desktop Support contains three components: Workstation Infrastructure, Technology Training, and. Maintenance of Desktop Workstations:

- Workstation Infrastructure
  - Provides media decontamination service, live test demonstrations of emerging technology, virus investigation and control, tactical hardware and software analysis and evaluations, and disk media recovery services.
  - Provides a centralized "Help Desk" service for ordering hardware repairs, technical support of software products used throughout Headquarters, and reporting of telephone system and Local Area Network (LAN) problems.
- Technology Training
  - Develops and delivers technical training courses, including new courses, enhanced courses, and revision of course materials, in the office automation environment to reflect software upgrades and enhancements.
  - Offers technical training and publishes a Departmental Training Information System course catalog and Information Management Technology Training Bulletins of class descriptions and schedules.
  - Offers Local Area Network-Based Computer Based Training .
  - Coordinates and schedules specialized training including individualized instruction and training that may be requested from or for employees with special needs.
- Maintenance of Desktop Work Stations
  - Installation, repair, upgrades, disconnections and reconnections to Desktop systems.
  - Loaner equipment when compatible equipment is available from the maintenance shops and customer equipment cannot be repaired within 24 hours.
  - Time & Material services per fee schedule including relocations, repairs to peripherals, repairs to facsimile equipment.
  - Maintenance contracts with third party vendors to service specialized equipment per customer request.
  - Warranty coordination service for repairs covered under vendor warranty. This includes returning equipment for such repair and assuring that the work has been done when the equipments returns from the vendor, and reinstallation of the product for the user after repairs have been completed.

Board Pricing Policy

- Certain expenses, such as virus protection, adaptive workstation support, and half of the Help Desk (Software HOTLINE) costs, are infrastructure and allocated among programs by the number of workstations.
- Training services are charged on a user fee basis.
- Customers have the choice of three options for maintenance of desktop workstations:
  - Annual Subscription: Maintenance fee per workstation for microcomputer workstation repair or portable notebook computer, with or without docking station, to include (a) onsite repair; (b) loaner equipment, when available, for equipment that will be out of service for more than 24 hours; and (c) installation of compatible upgrade components.
  - Warranty Service: Warranty maintenance administration is offered and covers performance of all vendor required diagnostics, picking up, packaging, shipping, tracking and ensuring return of hardware shipped off-site for warranty maintenance, as well as installation upon return.
  - Time and Materials: Devices as well as desktop units not elected to be covered under Desktop Services subscription, may be covered under a pay as you use Time and Material contract, based on an hourly labor rate.
- Finally, the remaining half of Help Desk (Hardware HOTLINE) costs referenced in the first bullet completes this second component.

Table 5 provides the estimated desktop charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 5: Desktop			
Office of the Secretary	9	8	8
Board of Contract Appeals	2	2	2
Bonneville Power Administration	0	0	0
Chief Financial Officer	47	49	49
Civilian Radioactive Waste Management	29	25	25
Congressional & Intergovernmental Affairs	23	3	3
Contract Reform and Privatization	0	0	0
Counterintelligence	0	2	2
Defense Programs	82	97	97
Economic Impact and Diversity	17	16	16
Energy Efficiency	146	92	92
Energy Information Administration	8	9	9
Environmental Management	173	188	188
Environment, Safety, and Health	50	48	48
Field Management	8	7	7
Fissile Materials Disposition	9	8	8
Fossil Energy	116	86	86
General Counsel	31	26	26
Hearings and Appeals	6	5	5
Inspector General	43	38	38
Intelligence	0	14	14
Management and Administration	432	331	331
Naval Reactors	0	0	0
Nuclear Energy	27	23	23
Nuclear Nonproliferation	118	140	140
Policy	29	31	31
Public Affairs	8	9	9
Science	57	62	62
Secretary of Energy Advisory Board	1	2	2
Western Area Power Administration	0	0	0
Worker Transition	8	8	8
Total Working Capital Fund	1,479	1,329	1,329

Electronic Services

Description

Pending a change in policy, the Electronic Services includes repair and maintenance of Headquarters radio communications and electronic equipment.

Board Pricing Policy

In FY 1997 and FY 1998, electronic services costs were included in the Building Occupancy business line as indirect cost allocated in proportion to direct costs. We have broken out Electronic Services in FY 1999 and FY 2000 as a separate business, but have used the prior methodology, proration by direct Building Occupancy costs, as the allocation method.

Table 6 provides the estimated electronic services charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

Table 6: Electronic Services	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Office of the Secretary	14	11	11
Board of Contract Appeals	4	3	3
Bonneville Power Administration	2	2	2
Chief Financial Officer	33	24	24
Civilian Radioactive Waste Management	21	16	16
Congressional & Intergovernmental Affairs	12	9	9
Contract Reform and Privatization	2	1	1
Counterintelligence	15	8	8
Defense Programs	57	44	44
Economic Impact and Diversity	10	8	8
Energy Efficiency	83	63	63
Energy Information Administration	119	83	83
Environmental Management	96	67	67
Environment, Safety, and Health	71	50	50
Field Management	14	11	11
Fissile Materials Disposition	6	6	6
Fossil Energy	40	30	30
General Counsel	47	36	36
Hearings and Appeals	14	10	10
Inspector General	27	19	19
Intelligence	21	16	16
Management and Administration	276	205	205
Naval Reactors	7	5	5
Nuclear Energy	21	14	14
Nuclear Nonproliferation	121	93	93
Policy	29	22	22
Public Affairs	9	7	7
Science	42	31	31
Secretary of Energy Advisory Board	3	2	2
Western Area Power Administration	2	2	2
Worker Transition	6	5	5
Total Working Capital Fund	1,224	903	903

Building Occupancy

Description

The core services in the Building Occupancy Business Line include space, utilities such as heat and electricity, cleaning services, snow removal, maintenance, pest control, trash removal, and waste recycling. Engineering and facilities services provided are drafting, construction, engineering, lock repair and key management, safety and occupational health, and conference support.

Board Pricing Policy

There are three components to the Board policy:

- On a building-by-building basis, direct rental value of the space assigned to each organization is calculated, based on the actual rent charged to the Department by the General Services Administration. Customer rent costs are based on areas expected to be assigned to each organization on October 1 of the Fiscal Year.
- Then the common use space costs in each building are divided among the tenants of that building based on their proportional shares of direct rent costs.
- Certain additional costs, such as common area alterations and health and life safety programs and the like, are allocated as a prorata addition to the building-by-building charges described above.

The changes from FY 1999 to FY 2000 primarily reflect new General Services Administration rental policies.

Table 7 provides the estimated building occupancy charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 7: Building Occupancy			
Office of the Secretary	652	666	710
Board of Contract Appeals	165	160	152
Bonneville Power Administration	101	103	105
Chief Financial Officer	1,461	1,509	1,473
Civilian Radioactive Waste Management	1,353	992	1,008
Congressional & Intergovernmental Affairs	526	538	546
Contract Reform and Privatization	0	75	76
Counterintelligence	0	485	593
Defense Programs	2,724	2,727	2,660
Economic Impact and Diversity	455	465	472
Energy Efficiency	3,704	3,857	3,904
Energy Information Administration	5,360	5,087	5,035
Environmental Management	4,649	4,118	4,440
Environment, Safety, and Health	3,083	3,059	3,339
Field Management	666	672	683
Fissile Materials Disposition	278	368	374
Fossil Energy	1,761	1,841	1,850
General Counsel	2,214	2,190	2,240
Hearings and Appeals	693	616	591
Inspector General	1,169	1,194	1,200
Intelligence	0	996	1,249
Management and Administration	12,469	12,617	12,429
Naval Reactors	296	306	317
Nuclear Energy	862	835	793
Nuclear Nonproliferation	5,437	5,684	5,695
Policy	1,320	1,348	1,369
Public Affairs	404	410	416
Science	1,902	1,888	1,803
Secretary of Energy Advisory Board	139	142	145
Western Area Power Administration	108	110	112
Worker Transition	346	277	293
Total Working Capital Fund	54,297	55,335	56,072

Supplies

Description

This business operates self service stores which carry a wide variety of consumable office products. At customers' request, we also acquire speciality items that are not stocked in the stores. Products carried are based on review of equipment in the agency inventory and customer requests.

Board Pricing Policy

Each organization pays for supplies purchased by its employees. The price charged includes the cost of the items and the distributed cost of operating the stores; that is the cost of the contractor staff, and warehouse storage and distribution of supplies.

Table 8 provides the estimated supplies charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 8: Supplies			
Office of the Secretary	15	15	15
Board of Contract Appeals	1	1	1
Bonneville Power Administration	4	4	4
Chief Financial Officer	95	95	95
Civilian Radioactive Waste Management	34	34	34
Congressional & Intergovernmental Affairs	22	22	22
Contract Reform and Privatization	0	0	0
Counterintelligence	0	0	0
Defense Programs	222	222	222
Economic Impact and Diversity	30	30	30
Energy Efficiency	220	220	220
Energy Information Administration	259	259	259
Environmental Management	233	233	233
Environment, Safety, and Health	177	177	177
Field Management	14	14	14
Fissile Materials Disposition	11	11	11
Fossil Energy	112	112	112
General Counsel	77	77	77
Hearings and Appeals	8	8	8
Inspector General	43	43	43
Intelligence	0	0	0
Management and Administration	588	588	588
Naval Reactors	5	5	5
Nuclear Energy	45	45	45
Nuclear Nonproliferation	291	291	291
Policy	73	73	73
Public Affairs	19	19	19
Science	159	159	159
Secretary of Energy Advisory Board	6	6	6
Western Area Power Administration	1	1	1
Worker Transition	13	13	13
Total Working Capital Fund	2,777	2,777	2,777

1710

Photocopy

Description

Provision of

- staffed copy centers at Forrestal, Germantown and L'Enfant Plaza capable of reproducing 25,000 impressions per document. Products available at these centers are: Black and white copies up to 11x17, multiple color copies up to 11x17, colored and white recycled stock, tape binding, velobinding (self service), comb (spiral) binding, 3 ring binding, 3-hole punching, tab creation and insertion, optical scanning of paper copy documents, document storage on tape and CD-rom, digital printing system, transparencies for vu-graphs.
- Centralized (Walkup) Copy Rooms.
- Dedicated (Customer-Assigned) Copiers including needs assessment analysis to determine workload and most appropriate equipment.

Board Pricing Policy

Each office pays the full cost to maintain and supply its assigned dedicated copiers. For walkup and staffed copiers, a cost per copy is calculated and programs are charged based on the number of copies made by program staff.

Table 9 provides the estimated photocopy charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 9 Copiers			
Office of the Secretary	44	49	49
Board of Contract Appeals	1	1	1
Bonneville Power Administration	0	0	0
Chief Financial Officer	142	77	77
Civilian Radioactive Waste Management	40	44	44
Congressional & Intergovernmental Affairs	61	69	69
Contract Reform and Privatization	0	0	0
Counterintelligence	0	33	33
Defense Programs	180	125	125
Economic Impact and Diversity	43	22	22
Energy Efficiency	225	219	219
Energy Information Administration	171	179	179
Environmental Management	267	231	231
Environment, Safety, and Health	153	135	135
Field Management	15	15	15
Fissile Materials Disposition	35	20	20
Fossil Energy	79	76	76
General Counsel	48	46	46
Hearings and Appeals	16	16	16
Inspector General	31	31	31
Intelligence	0	1	1
Management and Administration	397	361	361
Naval Reactors	0	0	0
Nuclear Energy	76	78	78
Nuclear Nonproliferation	219	198	198
Policy	57	55	55
Public Affairs	262	209	209
Science	100	100	100
Secretary of Energy Advisory Board	16	16	16
Western Area Power Administration	1	0	0
Worker Transition	17	17	17
Total Working Capital Fund	2,696	2,423	2,423

Mail Services

Description

The DOE Mail Center provides a variety of mail services for all official and other authorized mail for the Department of Energy and its employees. The services provided include the processing of all incoming postal mail, outgoing official mail, internal mail processing, accountable mail processing, pouch mail, a variety of overnight express mail services, directory services, and pick-up and delivery services.

Board Pricing Policy

Mail service pricing has three components: Offices pay the actual dollar meter value for outgoing United States Postal Service mail; the actual cost for Federal Express or other special mail; and pay for internal mail distribution based on the number of mail stops.

Table 10 provides the estimated mail services charges for each organization in Headquarters. These estimates reflect the United States Postal Service's proposed increase for first class mail.

Working Capital Fund Budget by Function

(dollars in thousands)

Table 10: Mail Services	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Office of the Secretary	16	13	17
Board of Contract Appeals	0	0	0
Bonneville Power Administration	13	12	14
Chief Financial Officer	86	85	89
Civilian Radioactive Waste Management	23	20	24
Congressional & Intergovernmental Affairs	30	26	30
Contract Reform and Privatization	0	0	0
Counterintelligence	0	10	14
Defense Programs	37	34	38
Economic Impact and Diversity	47	44	48
Energy Efficiency	157	198	202
Energy Information Administration	172	169	173
Environmental Management	90	130	134
Environment, Safety, and Health	70	75	79
Field Management	19	12	16
Fissile Materials Disposition	21	18	22
Fossil Energy	60	57	61
General Counsel	26	157	161
Hearings and Appeals	23	14	18
Inspector General	50	23	27
Intelligence	0	10	14
Management and Administration	481	403	401
Naval Reactors	0	0	0
Nuclear Energy	34	31	35
Nuclear Nonproliferation	151	110	114
Policy	76	57	61
Public Affairs	41	38	42
Science	94	93	97
Secretary of Energy Advisory Board	14	17	21
Western Area Power Administration	11	10	12
Worker Transition	18	15	19
Total Working Capital Fund	1,860	1,881	1,983

Printing and Graphics

Description

The printing and graphics business line provides procurement and liaison with commercial printers through the Government Printing Office. It also provides design and development of pre-press graphics, electronic forms and exhibits, and court reporting services. Contractor staff distribute in-house-produced materials as well as materials produced by other government agencies. This business line also provides professional photography, lab technicians, portrait studio operations, and graphics visual aids and presentation materials. Centralized visual archives are provided by through a staffed repository of general interest photos.

Board Pricing Policy

Organizations pay for direct printing costs and Federal Register costs. Additionally for graphics services, programs pay maintenance and depreciation costs on graphics equipment as a percentage allocation of costs incurred in the previous fiscal year.

Table 11 provides the estimated printing and graphics charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 11: Printing and Graphics			
Office of the Secretary	40	34	34
Board of Contract Appeals	0	0	0
Bonneville Power Administration	1	2	2
Chief Financial Officer	107	117	117
Civilian Radioactive Waste Management	78	43	43
Congressional & Intergovernmental Affairs	4	4	4
Contract Reform and Privatization	0	0	0
Counterintelligence	0	2	2
Defense Programs	50	42	42
Economic Impact and Diversity	39	43	43
Energy Efficiency	343	266	266
Energy Information Administration	789	818	818
Environmental Management	310	278	278
Environment, Safety, and Health	120	96	96
Field Management	30	19	19
Fissile Materials Disposition	81	65	65
Fossil Energy	177	196	196
General Counsel	59	83	83
Hearings and Appeals	181	179	179
Inspector General	51	43	43
Intelligence	0	6	6
Management and Administration	286	597	597
Naval Reactors	3	0	0
Nuclear Energy	35	43	43
Nuclear Nonproliferation	76	85	85
Policy	84	48	48
Public Affairs	98	132	132
Science	196	143	143
Secretary of Energy Advisory Board	40	42	42
Western Area Power Administration	48	43	43
Worker Transition	12	9	9
Total Working Capital Fund	3,338	3,478	3,478

Contract Closeout

Description

The contract closeout business line is the final stage in contract administration support for DOE Headquarters elements. Services include ensuring that all contracted products and services have been delivered and that costs incurred by the contractor are allowable and justified. Then, any remaining unexpended funds obligated under the contract are released.

Board Pricing Policy

Each Headquarters element pays for actual closeout cost, determined by the unit price of each contract instrument type and negotiated level of service.

Table 12 provides the estimated contract closeout charges for each organization in Headquarters.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 12: Contract Closeout			
Office of the Secretary	0	0	0
Board of Contract Appeals	0	0	0
Bonneville Power Administration	0	0	0
Chief Financial Officer	12	25	25
Civilian Radioactive Waste Management	14	12	12
Congressional & Intergovernmental Affairs	0	0	0
Contract Reform and Privatization	0	0	0
Counterintelligence	0	0	0
Defense Programs	14	14	14
Economic Impact and Diversity	4	19	19
Energy Efficiency	45	45	45
Energy Information Administration	48	52	52
Environmental Management	11	38	38
Environment, Safety, and Health	0	87	87
Field Management	11	15	15
Fissile Materials Disposition	0	0	0
Fossil Energy	50	94	94
General Counsel	16	16	16
Hearings and Appeals	1	0	0
Inspector General	5	1	1
Intelligence	0	0	0
Management and Administration	142	142	142
Naval Reactors	0	0	0
Nuclear Energy	18	18	18
Nuclear Nonproliferation	8	8	8
Policy	19	15	15
Public Affairs	0	0	0
Science	28	17	17
Secretary of Energy Advisory Board	0	0	0
Western Area Power Administration	0	0	0
Worker Transition	3	3	3
Total Working Capital Fund	449	621	621

Payroll Processing and Personnel Costs

Description

This business line integrates three areas of service.

- Payroll Services: Prepares civilian payrolls based on authenticated documentation. Computes, deposits, and reports Federal, State, and local income taxes. Maintains employee records related to Civil Service and Federal Employees Retirement Systems, reports retirement information to the Office of Personnel Management, and performs reconciliation of account balances with Office of Personnel Management and Treasury. Accounts and reports employee's health benefit coverage, thrift savings plans, and unemployment compensation, among other non salary employee payments. Maintains donated leave subsystem. Maintains and operates the Department's system of allocating payroll costs to the proper appropriation.
- Personnel Services: All personnel services will continue to be carried out by Federal employees and therefore do not fall under the Working Capital Fund payroll and personnel business line. Detailed employee information and Office of Personnel Management regulations are critical inputs to payroll and personnel services. Information systems which support this effort are outdated and unable to support Year 2000 compliance. The Department has embarked on an integrated, long-term solution to these problems since FY 1997.
- Personnel and Payroll Information: Implements state-of-the-art Corporate Human Resource Information System utilizing PeopleSoft commercial-off-the-shelf software and a data repository, DOEInfo. The systems development will implement personnel, payroll, and time and labor processes in conformance with the Department's business practices. The software provides the full range of personnel office services to include personnel action processing, staffing, classification, recruitment, performance management, training administration; employee relations support; health and safety/workers' compensation; career succession and planning; and skills inventory; payroll; and, time and attendance. Once complete the integrated system will provide accurate and timely pay to employees, meet regulatory reporting requirements in a timely and accurate manner, improve the integrity of human resource information; streamline business processes, eliminate non-value added work, transition to a paperless desktop work environment, eliminate redundant systems across the Department, and provide real-time reporting and information access to support management decision-making.

Board Pricing Policy

Costs for this business are allocated by distributing total costs to each program on the basis of their employment levels at the end of the previous fiscal year. For estimating purposes, the business is using employment targets developed during the budget cycle.

Table 13 provides the estimated distribution of costs by program customer.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 13: payroll and Personnel			
Office of the Secretary	3	5	7
Board of Contract Appeals	1	1	0
Bonneville Power Administration	6	0	0
Chief Financial Officer	28	35	38
Civilian Radioactive Waste Management	29	30	33
Congressional & Intergovernmental Affairs	5	7	7
Contract Reform and Privatization	0	0	0
Counterintelligence	0	1	2
Defense Programs	265	308	338
Economic Impact and Diversity	6	7	8
Energy Efficiency	75	90	93
Energy Information Administration	56	65	62
Environmental Management	402	468	508
Environment, Safety, and Health	53	62	62
Field Management	133	161	176
Fissile Matenals Disposition	3	5	5
Fossil Energy	129	152	152
General Counsel	24	32	31
Hearings and Appeals	7	4	8
Inspector General	37	44	47
Intelligence	0	6	6
Management and Administration	85	100	108
Naval Reactors	27	34	37
Nuclear Energy	26	26	29
Nuclear Nonproliferation	57	64	60
Other PMAs	0	36	42
Policy	16	19	21
Public Affairs	4	5	5
Science	69	69	79
Secretary of Energy Advisory Board	1	1	1
Western Area Power Administration	388	213	239
Worker Transition	4	4	4
Total Working Capital Fund	1,939	2,054	2,208

Corporate Executive Information System

Description

The Corporate Executive Information System (EIS) provides Departmental executives and senior managers immediate access to business information at their desktops. The Corporate EIS supports summary level analyses for management business decisions and provides information for external summary level reporting and inquiries. Currently, the Corporate EIS provides information on eight functional business areas by integrating data from six Departmental source systems. Plans provide for the functional business areas to be expanded to incorporate additional business information (both financial and programmatic) as Departmental manager identify their business information requirements. Business information and source systems providing information to the EIS will be expanded to provide for the new information requirements.

Board Pricing Policy

There are three components to the policy:

- On a per user basis, each organization will be charged for annual operational costs of the system. These costs will include software maintenance, operations and maintenance, and hardware upgrades. The operating costs will be distributed to the budgeted user base to derive annual per user costs.
- Each organization will be responsible for payment of user costs and such costs will be paid to the WCF account.
- An agreement between the WCF Business line Fund Manager, the WCF Business Line Service Manager, and Departmental organizations will be prepared and approved by all parties participating as managers and customers of the WCF account.

Table 14 provides the estimated distribution of costs by program customer.

Working Capital Fund Budget by Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 14: Corporate Executive Information System			
Office of the Secretary		1	1
Board of Contract Appeals		0	0
Bonneville Power Administration		0	0
Chief Financial Officer		18	18
Civilian Radioactive Waste Management		4	4
Congressional & Intergovernmental Affairs		0	0
Contract Reform and Privatization		0	0
Counterintelligence		0	0
Defense Programs		2	2
Economic Impact and Diversity		0	0
Energy Efficiency		4	4
Energy Information Administration		2	2
Environmental Management		32	32
Environment, Safety, and Health		1	1
Field Management		1	1
Fissile Materials Disposition		2	2
Fossil Energy		1	1
General Counsel		2	2
Hearings and Appeals		0	0
Inspector General		0	0
Intelligence		0	0
Management and Administration		5	5
Naval Reactors		0	0
Nuclear Energy		3	3
Nuclear Nonproliferation		6	6
Policy		1	1
Public Affairs		0	0
Science		6	6
Secretary of Energy Advisory Board		1	1
Western Area Power Administration		0	0
Worker Transition		2	2
Total Working Capital Fund	0	94	94

Working Capital Fund Estimates by Customer

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 1: Office of the Secretary			
Telephones	,63	59	59
Networking	35	18	18
Desktop	9	8	8
Electronic Services	14	11	11
Building Occupancy	652	666	710
Supplies	15	15	15
Copiers	44	49	49
Mail Services	16	14	17
Printing and Graphics	40	34	34
Contract Closeout	0	0	0
Payroll and Personnel	3	5	7
Corporate Executive Information System	0	1	1
Total Working Capital Fund	891	880	929

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 2: Board of Contract Appeals			
Telephones	5	5	5
Networking	0	0	0
Desktop	2	2	2
Electronic Services	4	3	3
Building Occupancy	165	160	152
Supplies	1	1	1
Copiers	1	1	1
Mail Services	0	0	0
Printing and Graphics	0	0	0
Contract Closeout	0	0	0
Payroll and Personnel	1	1	1
Corporate Executive Information System	0	0	0
Total Working Capital Fund	179	173	165

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 3. Bonneville Power Administration	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	12	13	13
Networking	0	0	0
Desktop	0	0	0
Electronic Services	2	2	2
Building Occupancy	101	103	105
Supplies	4	4	4
Copiers	0	0	0
Mail Services	13	12	13
Printing and Graphics	1	2	2
Contract Closeout	0	0	0
Payroll and Personnel	6	0	0
Corporate Executive Information System	0	0	0
Total Working Capital Fund	139	136	139

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 4. Chief Financial Officer	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	232	227	227
Networking	157	130	130
Desktop	47	49	49
Electronic Services	33	24	24
Building Occupancy	1,461	1,509	1,473
Supplies	95	95	95
Copiers	142	77	77
Mail Services	86	85	89
Printing and Graphics	107	117	117
Contract Closeout	12	25	25
Payroll and Personnel	28	35	38
Corporate Executive Information System	0	18	18
Total Working Capital Fund	2,400	2,391	2,362

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 5: Civilian Radioactive Waste Management			
Telephones	151	146	146
Networking	104	106	106
Desktop	29	25	25
Electronic Services	21	16	16
Building Occupancy	1,353	992	1,008
Supplies	34	34	34
Copiers	40	44	44
Mail Services	23	21	25
Printing and Graphics	78	43	43
Contract Closeout	14	12	12
Payroll and Personnel	29	30	33
Corporate Executive Information System	0	4	4
Total Working Capital Fund	1,876	1,473	1,496

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 6: Congressional and Intergovernmental Affairs			
Telephones	51	51	51
Networking	16	17	17
Desktop	23	3	3
Electronic Services	12	9	9
Building Occupancy	526	538	546
Supplies	22	22	22
Copiers	61	69	69
Mail Services	30	27	31
Printing and Graphics	4	4	4
Contract Closeout	0	0	0
Payroll and Personnel	5	7	7
Corporate Executive Information System	0	0	0
Total Working Capital Fund	750	747	759

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 7: Contract Reform and Privatization	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 7: contract Reform and Privatization			
Telephones	0	3	3
Networking	0	3	3
Desktop	0	0	0
Electronic Services	2	1	1
Building Occupancy	0	75	76
Supplies	0	1	1
Copiers	0	0	0
Mail Services	0	0	0
Printing and Graphics	0	0	0
Contract Closeout	0	0	0
Payroll and Personnel	0	0	0
Corporate Executive Information System	0	0	0
Total Working Capital Fund	2	83	84

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 8: Counterintelligence	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	0	27	27
Networking	0	6	6
Desktop	0	2	2
Electronic Services	15	8	8
Building Occupancy	0	485	593
Supplies	0	6	6
Copiers	0	33	33
Mail Services	0	10	13
Printing and Graphics	0	2	2
Contract Closeout	0	0	0
Payroll and Personnel	0	1	2
Corporate Executive Information System	0	0	0
Total Working Capital Fund	15	580	692

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 9: Defense Programs			
Telephones	513	504	504
Networking	297	294	294
Desktop	82	97	97
Electronic Services	57	44	44
Building Occupancy	2,724	2,727	2,660
Supplies	222	222	222
Copiers	180	125	125
Mail Services	37	33	38
Printing and Graphics	50	41	41
Contract Closeout	14	14	14
Payroll and Personnel	265	308	338
Corporate Executive Information System	0	2	2
Total Working Capital Fund	4,441	4,411	4,379

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 10: Economic Impact and Diversity			
Telephones	46	48	48
Networking	27	27	27
Desktop	17	16	16
Electronic Services	10	8	8
Building Occupancy	455	465	472
Supplies	30	30	30
Copiers	43	22	22
Mail Services	47	44	48
Printing and Graphics	39	43	43
Contract Closeout	4	19	19
Payroll and Personnel	6	7	8
Corporate Executive Information System	0	0	0
Total Working Capital Fund	724	729	741

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 11: Energy Efficiency	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	424	452	452
Networking	224	256	256
Desktop	146	92	92
Electronic Services	83	63	63
Building Occupancy	3,704	3,857	3,904
Supplies	220	220	220
Copiers	225	219	219
Mail Services	157	199	202
Printing and Graphics	343	266	266
Contract Closeout	45	45	45
Payroll and Personnel	75	90	93
Corporate Executive Information System	0	4	4
Total Working Capital Fund	5,646	5,763	5,816

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 12: Energy Information Administration	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	537	516	516
Networking	1	2	2
Desktop	8	9	9
Electronic Services	119	83	83
Building Occupancy	5,360	5,087	5,035
Supplies	259	259	259
Copiers	171	179	179
Mail Services	172	170	173
Printing and Graphics	789	818	818
Contract Closeout	48	52	52
Payroll and Personnel	56	65	62
Corporate Executive Information System	0	2	2
Total Working Capital Fund	7,520	7,242	7,190

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 13: Environmental Management			
Telephones	637	616	616
Networking	350	321	321
Desktop	173	188	188
Electronic Services	96	67	67
Building Occupancy	4,649	4,118	4,440
Supplies	233	232	232
Copiers	267	231	231
Mail Services	90	131	134
Printing and Graphics	310	278	278
Contract Closeout	11	38	38
Payroll and Personnel	402	468	508
Corporate Executive Information System	0	32	32
Total Working Capital Fund	7,218	6,720	7,085

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 14: Environment, Safety, and Health			
Telephones	425	424	424
Networking	272	265	265
Desktop	50	48	48
Electronic Services	71	50	50
Building Occupancy	3,083	3,059	3,339
Supplies	177	177	177
Copiers	153	135	135
Mail Services	70	75	79
Printing and Graphics	120	96	96
Contract Closeout	0	87	87
Payroll and Personnel	53	62	62
Corporate Executive Information System	0	1	1
Total Working Capital Fund	4,474	4,479	4,763

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 15: Field Management			
Telephones	51	46	46
Networking	39	35	35
Desktop	8	7	7
Electronic Services	14	11	11
Building Occupancy	666	672	683
Supplies	14	14	14
Copiers	15	15	15
Mail Services	19	12	16
Printing and Graphics	30	19	19
Contract Closeout	11	15	15
Payroll and Personnel	133	161	176
Corporate Executive Information System	0	0	0
Total Working Capital Fund	1,000	1,007	1,037

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 16. Fissile Materials Disposition			
Telephones	25	28	28
Networking	16	16	16
Desktop	9	8	8
Electronic Services	6	6	6
Building Occupancy	278	368	374
Supplies	11	11	11
Copiers	35	20	20
Mail Services	21	18	22
Printing and Graphics	81	65	65
Contract Closeout	0	0	0
Payroll and Personnel	3	5	5
Corporate Executive Information System	0	2	2
Total Working Capital Fund	485	547	557

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 17. Fossil Energy			
Telephones	258	263	263
Networking	123	126	126
Desktop	116	86	86
Electronic Services	40	30	30
Building Occupancy	1,761	1,841	1,850
Supplies	112	112	112
Copiers	79	76	76
Mail Services	60	57	61
Printing and Graphics	177	196	196
Contract Closeout	50	94	94
Payroll and Personnel	129	152	152
Corporate Executive Information System	0	1	1
Total Working Capital Fund	2,905	3,034	3,047

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 18: General Counsel			
Telephones	189	172	172
Networking	102	96	96
Desktop	31	26	26
Electronic Services	47	36	36
Building Occupancy	2,214	2,190	2,240
Supplies	77	77	77
Copiers	48	46	46
Mail Services	26	157	161
Printing and Graphics	59	83	83
Contract Closeout	16	16	16
Payroll and Personnel	24	32	31
Corporate Executive Information System	0	2	2
Total Working Capital Fund	2,833	2,933	2,986

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 19: Hearings and Appeals			
Telephones	44	43	43
Networking	34	42	42
Desktop	6	5	5
Electronic Services	14	10	10
Building Occupancy	693	616	591
Supplies	8	8	8
Copiers	16	16	16
Mail Services	23	14	18
Printing and Graphics	181	179	179
Contract Closeout	1	0	0
Payroll and Personnel	7	4	8
Corporate Executive Information System	0	0	0
Total Working Capital Fund	1,027	937	920

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 20 Inspector General			
Telephones	103	148	148
Networking	78	83	83
Desktop	43	38	38
Electronic Services	27	19	19
Building Occupancy	1,169	1,194	1,200
Supplies	43	43	43
Copiers	31	31	31
Mail Services	50	23	27
Printing and Graphics	51	43	43
Contract Closeout	5	1	1
Payroll and Personnel	37	44	47
Corporate Executive Information System	0	0	0
Total Working Capital Fund	1,637	1,667	1,680

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 21. Intelligence			
Telephones	0	41	41
Networking	0	0	0
Desktop	0	14	14
Electronic Services	21	16	16
Building Occupancy	0	996	1,249
Supplies	0	28	28
Copiers	0	1	1
Mail Services	0	10	14
Printing and Graphics	0	6	6
Contract Closeout	0	0	0
Payroll and Personnel	0	6	6
Corporate Executive Information System	0	0	0
Total Working Capital Fund	21	1,118	1,375

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 22: Management and Administration			
Telephones	1,174	1,127	1,127
Networking	692	638	638
Desktop	432	331	331
Electronic Services	276	205	205
Building Occupancy	12,469	12,617	12,429
Supplies	588	588	588
Copiers	397	361	361
Mail Services	481	403	407
Printing and Graphics	286	595	595
Contract Closeout	142	142	142
Payroll and Personnel	85	101	108
Corporate Executive Information System	0	5	5
Total Working Capital Fund	17,022	17,113	16,936

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 23: Naval Reactors			
Telephones	139	140	140
Networking	0	0	0
Desktop	0	0	0
Electronic Services	7	5	5
Building Occupancy	296	306	317
Supplies	5	5	5
Copiers	0	0	0
Mail Services	0	0	0
Printing and Graphics	3	0	0
Contract Closeout	0	0	0
Payroll and Personnel	27	34	37
Corporate Executive Information System	0	0	0
Total Working Capital Fund	477	490	504

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 24: Nuclear Energy			
Telephones	180	182	182
Networking	93	94	94
Desktop	27	23	23
Electronic Services	21	14	14
Building Occupancy	862	835	793
Supplies	45	45	45
Copiers	76	78	78
Mail Services	34	31	35
Printing and Graphics	35	43	43
Contract Closeout	18	18	18
Payroll and Personnel	26	26	29
Corporate Executive Information System	0	3	3
Total Working Capital Fund	1,417	1,392	1,357

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 25: Nuclear Nonproliferation			
Telephones	764	744	744
Networking	66	109	109
Desktop	118	140	140
Electronic Services	121	93	93
Building Occupancy	5,437	5,684	5,695
Supplies	291	257	257
Copiers	219	198	198
Mail Services	151	110	114
Printing and Graphics	76	85	85
Contract Closeout	8	8	8
Payroll and Personnel	57	64	60
Corporate Executive Information System	0	6	6
Total Working Capital Fund	7,308	7,498	7,509

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 26: Policy			
Telephones	155	151	151
Networking	67	67	67
Desktop	29	31	31
Electronic Services	29	22	22
Building Occupancy	1,320	1,348	1,369
Supplies	73	73	73
Copiers	57	55	55
Mail Services	76	57	61
Printing and Graphics	84	48	48
Contract Closeout	19	15	15
Payroll and Personnel	16	19	21
Corporate Executive Information System	0	1	1
Total Working Capital Fund	1,925	1,887	1,914

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 27: Public Affairs			
Telephones	29	29	29
Networking	16	17	17
Desktop	8	9	9
Electronic Services	9	7	7
Building Occupancy	404	410	416
Supplies	19	19	19
Copiers	262	209	209
Mail Services	41	38	42
Printing and Graphics	98	132	132
Contract Closeout	0	0	0
Payroll and Personnel	4	5	5
Corporate Executive Information System	0	0	0
Total Working Capital Fund	890	875	885

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 28: Science			
Telephones	349	352	352
Networking	270	269	269
Desktop	57	62	62
Electronic Services	42	31	31
Building Occupancy	1,902	1,888	1,803
Supplies	159	159	159
Copiers	100	100	100
Mail Services	94	93	97
Printing and Graphics	196	143	143
Contract Closeout	28	17	17
Payroll and Personnel	69	69	79
Corporate Executive Information System	0	6	6
Total Working Capital Fund	3,266	3,189	3,118

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 29: Secretary of Energy Advisory Board	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	10	11	11
Networking	7	7	7
Desktop	1	2	2
Electronic Services	3	2	2
Building Occupancy	139	142	145
Supplies	6	6	6
Copiers	16	16	16
Mail Services	14	17	21
Printing and Graphics	40	42	42
Contract Closeout	0	0	0
Payroll and Personnel	1	1	1
Corporate Executive Information System	0	0	0
Total Working Capital Fund	237	246	253

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

Table 30: Western Area Power Administration	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Telephones	10	10	10
Networking	0	0	0
Desktop	0	0	0
Electronic Services	2	2	2
Building Occupancy	108	110	112
Supplies	1	1	1
Copiers	1	0	0
Mail Services	11	10	12
Printing and Graphics	48	43	43
Contract Closeout	0	0	0
Payroll and Personnel	388	213	239
Corporate Executive Information System	0	0	0
Total Working Capital Fund	569	389	419

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 31: Worker Transition			
Telephones	29	30	30
Networking	18	15	15
Desktop	8	8	8
Electronic Services	6	5	5
Building Occupancy	346	277	293
Supplies	13	13	13
Copiers	17	17	17
Mail Services	18	15	19
Printing and Graphics	12	9	9
Contract Closeout	3	3	3
Payroll and Personnel	4	4	4
Corporate Executive Information System	0	2	2
Total Working Capital Fund	474	398	418

Working Capital Fund Budget by Organization and Function

(dollars in thousands)

	FY 1998 Actual	FY 1999 Estimate 11/98	FY 2000 Estimate 11/98
Table 32: Other PMAs			
Payroll and Personnel	0	36	42
Total Working Capital Fund	0	36	42

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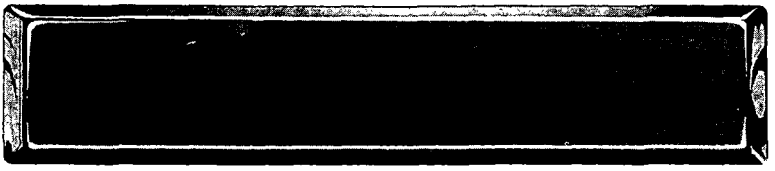

Environmental Management

Defense Environmental Restoration & Waste Management
Defense Facilities Closure Project
Environmental Management Privatization
Non-Defense Environmental Management
Uranium Enrichment D&D

February 1999

Office of the Chief Financial Officer

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(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy and Water Development Appropriations					
Energy supply	758,899	770,053	841,888	71,835	9.3%
Uranium supply & enrichment activities	—	—	—	—	—
Non-defense environmental management	463,454	431,200	330,934	-100,266	-23.3%
Uranium enrichment D&D fund	230,200	220,200	240,198	19,998	9.1%
Science	2,483,573	2,697,860	2,835,393	137,533	5.1%
Departmental administration	133,280	111,572	123,490	11,918	10.7%
Office of the inspector general	27,500	29,000	30,000	1,000	3.4%
Atomic energy defense activities:					
Weapons activities	4,146,692	4,400,000	4,531,000	131,000	3.0%
Defense environmental restoration & waste management	4,319,575	4,320,567	4,505,676	185,109	4.3%
Defense facilities closure projects	995,885	1,041,740	1,054,492	12,752	1.2%
Environmental management privatization	200,000	228,357	228,000	-357	-0.2%
Other defense activities	1,702,178	2,201,087	1,792,000	-409,087	-18.6%
Defense nuclear waste disposal	190,000	189,000	73,000	-116,000	-61.4%
Total, Atomic energy defense activities	11,554,330	12,380,751	12,184,168	-196,583	-1.6%
Power marketing administrations	243,619	237,510	199,947	-37,563	-15.8%
Federal energy regulatory commission	—	—	—	—	—
Nuclear waste disposal	156,000	169,000	297,000	128,000	75.7%
Geothermal resources development fund	—	—	-821	-821	—
Total, Energy and Water Development Appropriations	16,050,855	17,047,146	17,082,197	35,051	0.2%

(dollars in thousands)

	FY 1998 Comparable Approp.	FY 1999 Comparable Approp.	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Interior and Related Agencies Appropriations					
Fossil energy research and development	356,517	384,056	364,000	-20,056	-5.2%
Alternative fuels production	-1,500	-1,300	-1,000	300	23.1%
Naval petroleum and oil shale reserves	107,000	14,000	—	-14,000	-100.0%
Elk Hills school lands fund	—	36,000	36,000	—	—
Energy conservation	584,354	627,701	837,515	209,814	33.4%
Economic regulation	2,725	1,801	2,000	199	11.0%
Strategic petroleum reserve	207,500	160,120	164,000	3,880	2.4%
Energy information administration	66,800	70,500	72,644	2,144	3.0%
Clean coal technology	-101,000	-40,000	-246,000	-206,000	-515.0%
Total, Interior and Related Agencies Appropriations	1,222,396	1,252,878	1,229,159	-23,719	-1.9%
Uranium enrichment D&D fund discretionary payments	-388,000	-398,088	-420,000	-21,912	-5.5%
Excess fees and recoveries, FERC	-10,159	-29,446	-28,342	1,104	3.7%
Colorado river basin	-16,098	-16,098	-21,000	-4,902	-30.5%
Total, Department of Energy	16,858,994	17,856,392	17,842,014	-14,378	-0.1%

Staffing Summary

	FTEs			% Change
	FY 1998	FY 1999	FY 2000	
Energy and Water Development Activities				
Energy Supply	1,536	1,629	1,331	-18.3%
Science	263	318	325	2.2%
Atomic Energy Defense Activities				
Weapons Activities	1,837	1,876	1,799	-4.1%
Environmental Restoration & Waste Mgmt	2,782	2,764	2,697	-2.4%
Other Defense Activities	846	736	964	31.0%
Total Atomic Energy Defense Activities	5,465	5,376	5,460	1.6%
Departmental Administration	1,258	1,302	1,303	0.1%
Inspector General	245	266	257	-3.4%
Power Marketing Administration	4,253	4,347	4,309	-0.9%
Federal Energy Regulatory Commission	1,318	1,320	1,320	-0.0%
Nuclear Waste Fund	202	197	196	-0.5%
Total, Energy & Water Development Activities	14,540	14,755	14,501	-1.7%

Staffing Summary

	FTEs			% Change
	FY 1998	FY 1999	FY 2000	
Interior and Related Agencies				
Clean Coal Technology	61	67	60	-10.4%
Fossil Energy Research & Development	660	679	681	0.3%
Naval Petroleum & Oil Shale Reserves	59	54	39	-27.8%
Energy Conservation	419	441	426	-3.4%
Economic Regulation	22	17	16	-5.9%
Strategic Petroleum Reserve	132	135	125	-7.4%
Energy Information Administration	382	378	371	-1.9%
Total, Interior & Related Agencies Activities	1,735	1,771	1,718	-3.0%
Total, Department of Energy	16,275	16,526	16,219	-1.9%

Environmental Management

Executive Budget Summary

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Environmental Management

Executive Budget Summary

The Department of Energy's (DOE) Environmental Management (EM) program is requesting $5.700 billion of traditional budget authority and $228 million of privatization funding, for a total Fiscal Year (FY) 2000 budget request of $5.928 billion. The traditional budget authority request consists of $4 494 billion under the Defense Environmental Restoration and Waste Management appropriation, $1.055 billion under the Defense Facilities Closure Projects appropriation, $331 million under the Non-Defense Environmental Management appropriation, and $240 million under the Uranium Enrichment Decontamination and Decommissioning Fund appropriation. This request is offset by $420 million for the Federal Contribution to the Uranium Enrichment Decontamination and Decommissioning Fund. With this level of funding, EM will be substantially in compliance with applicable environmental and other requirements. The structure of the EM budget continues to be based on the grouping of activities into projects at the various Departmental sites, a crucial step in accelerating work and lowering the cost of carrying out the EM mission.

I. EM FY 2000 Budget Request

The Environmental Management program has developed a budget request of $5.700 billion for FY 2000 for traditional budget authority. This request represents an increase of approximately $100 million over the current appropriation of $5.604 billion for FY 1999. This provides sufficient funding to be substantially in compliance with agreements and requirements, address most planned Defense Nuclear Facilities Safety Board recommendations, address known significant safety risk issues, develop cost- and schedule-reducing alternative cleanup technologies, and accelerate the closure of EM sites.

The FY 2000 budget request will enable the EM program to continue towards the fulfillment of the vision of closing as many sites as possible by 2006. This request fully reflects the project-oriented structure that EM has developed as a key component of its strategy to accelerate cleanup and reduce costs. It includes a brief description of each project, the budget authority requested for the project, and the performance metrics that will be used to measure the progress of the project. In accordance with the Government Performance and Results Act, these performance measures also reflect the linkage between the EM budget and the program's goals and objectives as stated in the Department of Energy's Strategic Plan, the commitments for FY 2000 in the DOE Annual Performance Plan, and the commitments in the Secretary's Performance Agreement with the President. The requested funds for Science and Technology activities are consistent with the EM Research and Development Program Plan which 'maps' investments in solutions to site-identified needs. EM's Science and Technology program represents approximately two-thirds of DOE's Environmental Quality Business Line Research and Development Portfolio.

In addition to the request for traditional budget authority, EM is requesting $228 million in the Defense Environmental Management Privatization account for FY 2000. This funding will enable EM to continue on schedule with the following privatization activities:

- Tank Waste Remediation System, Phase I, at Richland
- Advanced Mixed Waste Treatment Project at Idaho
- Spent Nuclear Fuel Dry Storage Project at Idaho
- Transuranic Waste Treatment Project at Oak Ridge
- Environmental Management/Waste Management Disposal Facility at Oak Ridge

The following table is a summary of EM's FY 2000 budget request compared to the FY 1998 and FY 1999 appropriated levels.

EM FY 2000 Budget Request

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Albuquerque	316,734	202,541	202,600
Carlsbad	173,700	185,404	186,404
Chicago	49,776	54,063	54,100
Idaho [a]	415,556	435,642	409,422
Nevada	68,918	80,081	85,307
Oakland	95,467	86,808	86,850
Oak Ridge	547,258	501,561	530,561
Ohio	486,272	497,928	512,928
Richland	951,397	998,492	1,065,111
Rocky Flats	632,100	657,200	657,210
Savannah River	1,127,923	1,214,946	1,222,500
Multi-Site	113,053	85,542	77,098
Program Direction	345,000	337,073	349,409
Science & Technology	269,213	243,156	230,500
D&D Fund Deposit	388,000	398,088	420,000
Ur/Th Reimbursement	40,000	30,000	30,000
Subtotal, EM	6,020,367	6,008,525	6,120,000
Use of Prior Year Balances	-11,253	-20,658	0
Y2K Supplemental Appropriation	0	13,840	0
FFTF (transferred to NE in FY 99)	41,727	0	0
D&D Fund Offset	-388,000	-398,088	-420,000
Total, Traditional Budget Authority	5,662,841	5,603,619	5,700,000
Privatization	200,000	228,357	228,000
Total, EM [b]	5,862,841	5,831,976	5,928,000

II. Background: Cleanup Challenges and Vision for the Future

Over the past five decades, DOE and its predecessor agencies developed the largest government-owned industry in the United States, responsible for the research, development, testing, and production of

[a] The Idaho program for FY 2000 also includes the use of $43 million in prior year balances for Pit 9 activities, for a total program level of $452.422 million.

[b] Excludes funding appropriated or requested under EM, but managed by EH for health studies activities ($12.0 million in FY 1999 and $20.0 million in FY 2000).

nuclear weapons, as well as a variety of nuclear-related research projects. When most nuclear weapons production operations ceased in the late 1980's, DOE created the EM program to manage the thousands of contaminated areas and buildings, huge waste volumes, and nuclear materials left over from the nuclear weapons production process. EM's responsibilities include facilities and areas at 113 geographic sites (excluding the 21 sites in the Formerly Utilized Sites Remedial Action Project transferred to the U.S. Army Corps of Engineers). These sites are located in 30 States and one territory, which occupy an area equal to that of Rhode Island and Delaware combined -- about 2 million acres.

In addition to EM's responsibilities for environmental remediation, decommissioning of facilities, and the storage, treatment, and disposal of nuclear and hazardous wastes, EM is responsible for the safe management of approximately 18 metric tons of plutonium metal and oxides and residues. Plutonium can spontaneously ignite in contact with air in certain circumstances, so careful handling and storage safety is required. Because of its potential use in nuclear weapons, plutonium must also be stored in a manner to prevent theft or diversion. Thousands of metric tons of highly radioactive spent nuclear fuel, a by-product of the Department's weapons production process, are also under EM's care. Some of this spent fuel is corroding in its current storage. Further, EM is managing the return of foreign research reactor spent nuclear fuel from a number of different nations to meet key non-proliferation goals of the United States. EM's goals in meeting these responsibilities are to reduce urgent risks to human health and the environment, meet crucial national non-proliferation goals, manage the long-term contamination and safety threats, and reduce program costs.

In June 1996, to reconcile the pressing need to stabilize spending levels in the short term, while reducing both economic and environmental liabilities over the long term, EM established a vision for the program:

> *By 2006, the Environmental Management program intends to complete cleanup at most of its 53 remaining sites. At the 10 remaining sites, including our five largest sites, treatment will continue for the remaining "legacy" waste streams. This vision will drive budget decisions, the sequencing of projects, and the actions needed to meet program objectives. This vision will be implemented in collaboration with stakeholders, regulators, and Tribal Nations.*

Accelerating cleanup and project completion is a central goal of the EM program. Accelerating cleanup can reduce both short-term and life-cycle program costs and is necessary to demonstrate progress towards the completion of the EM mission. As of the end of FY 1998, cleanup had been completed at 65 of the 113 geographic sites in the EM program, leaving 48 to be completed.

Even after completing cleanup, EM will maintain a presence at most sites to monitor, maintain and provide information on the contained residual contamination. These activities are designed to maintain long-term protection of human health and the environment. Such long-term stewardship will include passive or active institutional controls and, often, treatment of groundwater over a long period of time. The extent of long-term stewardship required at a site will depend on the end state reached at that particular site. Each site's end state will be determined after consultation among DOE and other representatives of the Administration, Congress, Tribal Nations, representatives of regulatory agencies, and state and local authorities, representatives of non-governmental organizations, and interested members of the general public.

III. FY 2000 Budget Strategy/Priority

For the past several years, Congress has appropriated relatively stable traditional budget authority for the EM program at a level of approximately $5.6 billion. Over this same period, due to the decline in EM program uncosted carryover balances, actual expenditures for the program have declined from a high of $6.8 billion in FY 1996 to a projected $5 6 billion in FY 1999. Program requirements, however, have not been declining or stabilizing in a commensurate manner. For example, the sites' *Accelerating Cleanup: Paths to Closure* submissions indicate over 500 environmental problems for which new technology is needed in order to accomplish cleanup. The most recent life-cycle cost analysis of the EM program, as well as several programmatic issues that have arisen during the execution of the budget in FY 1998 and FY 1999, indicate that additional traditional budget authority, substantially above current levels, may be needed to address emerging issues and requirements.

The budget of the EM program is constrained by the Balanced Budget Agreement between the President and the Congress. The EM program is committed to living within these constraints. Accordingly, the EM program is committed to accommodating these emerging issues and requirements within the requested level of $5.7 billion for traditional budget authority. In a number of instances, this will require improved program efficiency, a reprioritization of current work, and/or adjusting funding profiles. EM intends to work with the Congress, regulators, the Defense Nuclear Facilities Safety Board, stakeholders, and Tribal Nations to address issues that may arise.

In developing the FY 2000 budget request, the Department's Chief Financial Officer established a "peer review" team, which consisted of representatives from five EM sites, EM Headquarters, and the Office of the Chief Financial Officer, to review the field EM budget submissions. The purpose of this review was to categorize the EM activities within the sites' budget requests in a consistent manner across the DOE complex in terms of the reason , or "driver," that funding was being sought for each project. The peer review proved useful in ensuring that all EM activities were characterized in a similar manner during the budget-building process. Accordingly, EM intends to use a similar process for building the budget request for FY 2001. EM will use the same matrix of drivers that the peer review team developed to categorize activities for the FY 2001 budget, and will share the categorization of each activity with regulators, stakeholders, and Tribal Nations.

The following are major principles and strategies that are the foundation for the EM program in FY 2000:

- Address serious risks
- Maintain compliance
- Accelerate cleanup and reduce costs
- Ship transuranic waste to the Waste Isolation Pilot Plant in Carlsbad, New Mexico
- Utilize privatization initiatives where appropriate
- Integrate waste and materials management
- Continue to make the EM program more efficient
- Accelerate deployment of technologies and invest in science
- Stabilize the Federal workforce
- Implement an Integrated Planning, Accountability and Budgeting System for EM
- Work with regulators, stakeholders, and Tribal Nations

A. Address Serious Risks

The Department is committed to ensuring its facilities and activities pose no undue risks to the public and worker health and safety. The FY 2000 budget request provides sufficient funding to accomplish this goal, as well as to reduce the most serious environmental risks across the DOE complex. These include maintaining the safe containment of high-level waste stored in tanks at Hanford, Washington; stabilizing plutonium at Hanford, Washington, Rocky Flats, Colorado, and Savannah River, South Carolina; and ensuring the safe storage of spent nuclear fuel at Hanford, Idaho, and Savannah River.

B. Maintain Compliance

At the FY 2000 total budget request of $5.928 billion (including privatization), EM will have sufficient funding to be substantially in compliance with applicable environmental and other requirements At some sites, there may be a gap between compliance requirements and the work that is expected to be accomplished. EM is striving for additional efficiencies and other measures to close this gap. EM will continue to work with regulators to address this issue. More specifically, EM will attempt to comply with all applicable requirements of Federal, State, and local statutes and regulations; permits, administrative orders, or judicial decrees; and enforceable milestones or schedules established in agreements negotiated between EM and regulators. If necessary, EM will close the gap by using funding available for other EM activities at each site, in accordance with the Department's reprogramming procedures. In addition, the EM program intends to meet commitments to the Defense Nuclear Facilities Safety Board. As the program resources continue to be fiscally constrained, innovation and close collaboration with Congress, regulators and stakeholders has been, and will continue to be, necessary to meet our compliance requirements in a practical and efficient manner. EM will work closely with regulators, the Defense Board, and others to achieve this objective. Additionally, the strategies identified in the following sections--accelerating cleanup, reducing costs, privatization, increasing efficiency, and accelerating deployment of new technologies--will help EM meet its compliance requirements in a more efficient and cost-effective manner.

C. Accelerate Cleanup and Reduce Costs

The Department's strategy for accelerating cleanup is presented in the *Accelerating Cleanup: Paths to Closure* report that was released in June 1998. This report provides a project-by-project depiction of the technical scope, cost, and schedule required to complete work at the remaining DOE sites. DOE officials, stakeholders, regulators, Tribal Nations, and the Congress now have a comprehensive management tool that can aid the analysis of the challenges that we face. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working aggressively to reduce outyear costs by completing projects in the quickest, most efficient manner possible, thereby reducing life-cycle costs and schedules

In order to more closely align the annual budget formulation process and the long-term strategies set forth in the *Accelerating Cleanup: Paths to Closure* process, all EM activities have been organized into "projects", which have a defined scope and end state. Project Baseline Summary documents describe these projects and include the following: scope, schedule, cost, compliance, safety and health, risk, performance metrics, and other data The EM program budget accounts are

structured to reflect the 2006 vision, and the Project Baseline Summaries have been grouped into the appropriate budget accounts to be consistent with these goals.

The strategy in the *Accelerating Cleanup: Paths to Closure* document allows EM to formulate budgetary and policy strategies and goals in the context of impacts to life-cycle costs and schedules. The Department recognizes that there may be differences in any given year between the actual budget requests and the funding used for analytical purposes in the report. This difference is inevitable due to the dynamic nature of the budget formulation process.

The funding levels presented in *Accelerating Cleanup: Paths to Closure* and the EM budget differ due to the constraints on EM funding imposed by the Balanced Budget Agreement. Absent any budgetary constraints, these baseline requirements would total well over $6 billion in traditional budget authority for FY 2000 and beyond. Part of the significant challenge in managing the EM program is to fit the baseline requirements within the current and expected funding levels. The strategies identified in the *Accelerating Cleanup: Paths to Closure* report to improve the program's efficiency and to reduce costs are critical to meeting this challenge.

Accelerating Cleanup: Paths to Closure will be updated annually. Annual updates of this report will reflect cleanup progress, advances in technologies, projected savings due to demonstrated enhanced performance, the effects of annual budget allocations, and changes in site end states. The next update to *Accelerating Cleanup: Paths to Closure* is planned to be completed in the summer of 1999.

In August 1997, the Secretary of Energy designated three sites -- Rocky Flats, Fernald and Miamisburg -- as pilot sites for accelerated closure. In support of the vision of accelerated cleanup and site closure, Congress in FY 1998 designated a new Defense Facilities Closure Projects appropriation to accelerate the closure of the Rocky Flats and Fernald sites In FY 1999, this appropriation account was expanded to include all of the Ohio sites. The Department's FY 2000 budget request for Environmental Management continues to support these initiatives, and includes sufficient funding to accelerate the Rocky Flats and Ohio sites.

EM achieved a major milestone in FY 1998 which significantly contributes to the overall EM cleanup mission. In FY 1998, all Uranium Mill Tailings Remedial Action Surface Project remediation activities were completed. This brings to a close one of the Department's longest running and major environmental cleanup programs, which was authorized by Congress in 1978 and cost approximately $1.5 billion, including $100 million provided by the states involved. Under the Uranium Mill Tailings Remedial Action Surface Project, the Department completed remedial actions at 22 of the 24 originally designated sites, with two sites being delisted and their responsibility transferred to the state of North Dakota. The Project involved efforts with 11 States, 2 Indian tribes, and 23 communities. Cleanup was performed at over 5,300 vicinity properties located near the 22 designated Uranium Mill Tailings Remedial Action sites, and over 40 million cubic yards of material were remediated and nineteen long-term disposal cells were constructed. At most of these sites, groundwater contamination remains (and is being addressed by the Uranium Mill Tailings Remedial Action Groundwater Project) and the disposal cells must be permanently monitored and maintained. The completion of the Uranium Mill Tailings Remedial Action Surface Project marks a significant milestone in the Department's efforts to remediate the environmental legacy from the production of nuclear weapons. Just as mining and milling of uranium was the first step towards the production of nuclear weapons, the completion of the Uranium Mill Tailings

Remedial Action Surface Project represents the first step towards "closing the circle" of the environmental legacy from nuclear weapons production.

D. Ship Transuranic Waste to the Waste Isolation Pilot Plant

The Secretary of Energy notified Congress on May 13, 1998, that after two decades of development, the Waste Isolation Pilot Plant was ready for operations for transuranic waste disposal since all the Land Withdrawal Act disposal prerequisites had been completed. The start of disposal operations has been delayed pending resolution of the 1992 Permanent Injunction for shipping waste to the Waste Isolation Pilot Plant for the now canceled test phase. Also, on July 17, 1998, three lawsuits were filed against the Environmental Protection Agency over its decision to certify the Waste Isolation Pilot Plant for radioactive waste disposal operations. Within these constraints, the Department remains committed to doing all it can to meet its obligations for the cleanup of its sites. Disposal operations are expected to begin in FY 1999, provided the legal constraints have been resolved. The FY 2000 request assumes the initiation of disposal operations in FY 1999. The FY 2000 request will allow the Waste Isolation Pilot Plant to ramp-up to 14 shipments per week of waste from the waste generator sites and be on track to achieve 17 shipments per week by the end of December 2000. Once waste treatment, transportation, and disposal have been completed, the transuranic waste will be isolated, and the risks from storing transuranic waste at multiple sites across the country will have been eliminated.

E. Utilize Privatization Initiatives Where Appropriate

Privatization remains a key component of EM's contracting strategy to meet cleanup challenges with declining resources. Essentially a form of fixed-price contracting, the objective of EM privatization is to reduce the cost of products and services by having the Government pay for products delivered in accordance with desired specifications (e.g., treated waste, waste disposed of, or soil remediated). Through open competition, market forces should establish the most efficient contractual price for a specified service or product while shifting some of the performance risk and incentives to the contractor. The selected contractor(s) will be responsible for and own development of technologies, equipment, and facilities necessary to deliver the end product or service. Whether privatization is the most appropriate contracting strategy for a particular site or activity is determined on a case-by-case basis.

In FY 2000, the EM program is requesting $228 million for privatization projects, including continuation of the Tank Waste Remediation System for high-level waste treatment at the Hanford Site in Washington, the Advanced Mixed Waste Treatment and the Spent Nuclear Fuel Dry Storage projects at Idaho, and the Environmental Management/Waste Management Disposal Facility and the Transuranic Waste Treatment projects at Oak Ridge, Tennessee.

As provided in the National Defense Authorization Act for Fiscal Year 1998, contracts for EM privatization projects must meet the following criteria: be awarded on a competitive basis; require the contractor to construct or acquire any equipment or facilities required to carry out the contract; require the contractor to bear any of the costs of the construction, acquisition, and operation of such equipment or facilities that arise before the commencement of the provision of goods or services under the contract; and provide for payment to the contractor under the contract only upon meeting the performance specifications in the contract. The EM goal in utilizing this methodology is to gain an edge through best-in-class management capability, business strategies, technological

approaches, schedule enhancements, regulatory experience, and cost efficiencies. This type of project funding is widely used in the private sector to finance power plants and other major investments. The Department believes the privatization program is the most cost-effective approach for the selected projects.

EM plans to provide increased training for the Federal staff responsible for oversight of the privatization projects. EM will establish criteria for the approval of the contractor's selection of managers for privatization projects, and the managers selected will be reviewed against these criteria. Quarterly reviews of the major privatization projects, including the Hanford Tank Waste Remediation System project and the Idaho Advanced Mixed Waste Treatment project, will continue to be conducted.

EM developed the Tank Waste Remediation System to manage the radioactive waste in the large underground storage tanks at the Hanford Site in Washington. The tanks at Hanford are one of the most urgent environmental and public health risks under the Department's purview. Approximately 56 million gallons of waste containing approximately 240,000 metric tons of processed chemicals and 250 million curies of waste are currently being stored in 177 tanks Treatment of this waste, to convert it into a more stable form, is the largest privatization initiative planned by EM.

The Advanced Mixed Waste Treatment project at the Idaho National Engineering and Environmental Laboratory will incinerate and solidify 65,000 cubic meters of transuranic waste located in retrievable storage. The contract has an option for treatment of up to 120,000 cubic meters of additional mixed wastes from around the United States.

The Spent Nuclear Fuel Dry Storage Project at the Idaho National Engineering and Environmental Laboratory will provide the capabilities to initiate interim dry modular storage of Spent Nuclear Fuel. The fuel currently resides in facilities at Idaho, various universities, and foreign research reactors This project will place approximately 50 cubic meters of spent nuclear fuel (11% of the Idaho total) into dry interim storage prior to shipment out of the State of Idaho.

The Transuranic Waste Treatment project at the Oak Ridge National Laboratory in Tennessee will transfer remote-handled transuranic waste sludge from 13 different tanks into the eight storage tanks which are co-located in the Melton Valley area and which contain the majority of the waste sludge. In addition to sludge, the transuranic waste project includes approximately 500 cubic meters of remote-handled solids and approximately 1,100 cubic meters of contact-handled solids. All transuranic solids will be delivered to the private vendor for treatment, followed by disposal at the Waste Isolation Pilot Plant in New Mexico.

At the Oak Ridge Reservation in Tennessee, the Environmental Management/Waste Management Disposal Facility will consist of a disposal cell with ancillary facilities to support initial operations and an area for the potential development of future treatment, storage, and disposal facilities. The disposal cell will have a 1.1 million cubic meter capacity, be above-grade, and be a Resource Conservation and Recovery Act-compliant earthen structure with a robust, multi-component cap. Based on projected waste volumes and cell design assumptions, the disposal cell is estimated to require 60-70 acres, with a total facility footprint of 100-120 acres, including initial support facilities and an area reserved for future expansion.

F. Integrate Waste and Materials Management

The EM FY 2000 budget request includes several key initiatives to substantially reduce mortgage and outyear costs by moving materials to other sites for interim storage pending final disposal. The EM program continues to formalize the baselines for each site, as well as integrate the baselines across sites for nuclear waste and materials. The Department has included funding in the FY 2000 budget request for the option of accelerating the movement of the non-pit plutonium from Rocky Flats to Savannah River two years earlier than previously planned, thus supporting Rocky Flats closure by 2006 rather than 2010. In this capacity, the Savannah River request, in conjunction with other Rocky Flats projects, could result in significant life-cycle cost savings. In FY 1999, the Department anticipates making decisions resulting from the Waste Management Programmatic Environmental Impact Statement, clarifying the number of low-level and mixed low-level waste treatment and disposal facilities that will operate around the complex. EM has developed initial disposition maps to show the pathways to move waste or materials from inventory/generation, through treatment or stabilization, to final disposition. EM has already opened discussions with representatives of affected States, through the National Governors' Association, on feasible and lower-cost options for disposal of mixed low-level and low-level waste.

G. Continue to Make the EM Program More Efficient

The EM program is striving for ways to become more efficient and to do more with less. Drawing upon past experience, knowledge of practices in the private sector, experience of other government agencies, and analysis of the performance of its program, EM is seeking to improve its productivity in order to bridge the gap between planned available funding and resources needed to meet program goals. Many of these strategies are set forth in more detail in the June 1998 *Accelerating Cleanup: Paths to Closure* document.

In order to reduce support costs, EM has adopted a common methodology for tracking such costs. Using cost category definitions developed by the Financial Management Systems Improvement Council, the Department's Chief Financial Officer is tracking this information, broken out by cost category, fiscal year, and direct and indirect funding sources. By examining cost trends in each of these categories and benchmarking these costs at EM sites against similar costs in the private sector, EM can focus on measures to reduce specific support costs. Savings are being achieved and hopefully more areas can be reduced, so more funding is available for actual cleanup.

H. Accelerate Deployment of Technologies and Invest in Science

The EM Science and Technology program has matured to the point where significant performance gains and cost savings, in the form of cost avoidance, can be achieved through aggressive deployment of the large number of currently and soon-to-be available technologies. In the *Accelerating Cleanup: Paths to Closure*, EM sites identified over 500 technology problems for which technological solutions can achieve schedule improvements prior to 2006 and produce significant cost savings. EM believes that technology development offers some of the program's best opportunities for substantial cost reductions. EM has implemented a Research and Development Program Plan that maps investments in solutions to site-identified needs to ensure work is being performed on the highest priority needs. This plan ensures our science and technology activities are planned and managed in an interactive, coordinated and participatory relationship with EM cleanup project managers and stakeholders.

EM has also identified those areas where innovative technologies will be needed to solve problems that are currently intractable or for which solutions will ultimately extend beyond a ten-year horizon. The EM Science Program, established in FY 1996, conducts a long-term basic research effort, in cooperation with the Department's Office of Science, that focuses on these long-term problems, such as subsurface contamination in the vadose zone and groundwater at the Hanford Site.

For FY 2000, the EM program is requesting $230.5 million for the Science and Technology program. The Science and Technology program has expanded its role to encompass basic research through deployment

I. Stabilize the Federal Work Force at Reduced Levels

The EM program needs to have an adequate number of appropriately-skilled Federal employees in the field and at Headquarters. These employees are necessary to integrate and coordinate among sites to improve efficiency, oversee contractors to ensure cost-effective use of tax dollars, and respond to concerns and issues raised by the regulators, stakeholders, and tribes. In May 1995, as part of the Department's Strategic Alignment Initiative, targets were established for Headquarters staffing levels consistent with the National Performance Review objectives of decentralizing government agencies, putting more work in the field locations, and generally reducing the size of the Federal government. In May 1998, the Department issued revised staffing targets to address changing priorities across the complex and the continued emphasis on reducing the Federal workforce. As a result of this second round of allocations, EM's Strategic Alignment Initiative end-of-year on-board target was further reduced in both FY 1999 and FY 2000. The revised targets will result in a total EM workforce reduction of 490 full-time equivalents since FY 1996. Headquarters staff has been reduced 281 full-time equivalents (a 40 percent reduction since FY 1996) and the field staff has been reduced 209 full-time equivalents.

On November 20, 1998, Secretary Richardson announced the successful completion of the Strategic Alignment Initiative and the implementation of the next phase, Workforce for the 21st Century Initiative (Workforce 21). This will enable the Department to hire and retain personnel in key areas with skills and technical expertise that are critical to the success of the EM program, as well as other Department missions in national security, energy resources, and science and technology.

To manage and oversee a multi-billion dollar program, EM must be able to attract and retain personnel with the necessary environmental, financial, managerial, and technical capabilities. The reductions in personnel and funding over the last several years have resulted in the loss of a significant number of highly qualified people. Further reductions, as well as a continued inability to replace people with critical skills who depart, will adversely affect the Department's ability to effectively manage this program.

The FY 2000 budget request assumes a level of 2,724 full-time equivalents in support of the EM program. This level, consistent with Workforce 21, is sufficient to support stable staff levels necessary for effective and efficient management of the EM program The following chart depicts the EM full-time equivalent staffing levels for Headquarters and the Field offices, by fiscal year.

Full-Time Equivalent Allocations

(whole FTEs)

	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
Headquarters	706	579	438	435	425
Field Offices	2,508	2,475	2,344	2,329	2,299
Total, EM	3,214	3,054	2,782	2,764	2,724

Headquarters staff has been reduced through attrition, a buyout program, and the transfer of several programmatic functions and associated personnel to the field. The following chart depicts the field office staffing trends from FY 1998 through FY 2000.

Federal Staffing Trends by Operations/Field Office

(whole FTEs)

	AL	CB	CH	FE	ID	NV	OK	OR	OH	RL	RF	SR
FY 1998	145	56	107	66	240	56	70	140	223	494	257	490
FY 1999	134	61	110	65	239	55	72	139	223	508	247	476
FY 2000	129	61	106	51	236	53	69	133	224	535	242	460

J. Implement an Integrated Planning, Accountability and Budgeting System for EM

EM is developing an Integrated Planning, Accountability and Budgeting System to document quantitative goals and performance metrics, track progress, and eliminate duplicative management and tracking systems, reviews, and reports Under this system, the EM program has reorganized all activities (formerly tracked in about 1,000 activity data sheets) into more than 390 projects comprised of a group of similar or associated activities that will be tracked from the planning stage through budget formulation and execution. DOE believes that this management focus on projects will support the EM goal of completing cleanup as soon as possible, increase efficiency, reduce costs, and provide a more stable and understandable reporting structure, which is discussed in more detail in Section IV.

K. Work with Regulators, Stakeholders and Tribal Nations

Public participation is a cornerstone of the EM program. By working cooperatively with regulators, stakeholders, and Tribal Nations, the EM program has improved its efficiency and been able to meet its regulatory requirements in a more efficient and cost-effective manner. EM has formally established a number of mechanisms for regular intersite dialogue and input into EM decision making on local and national issues. Among these mechanisms are the Environmental Management Advisory Board, Site-Specific Advisory Boards, and the State and Tribal Governmental Working Group; the National Governors' Association Task Force; the National Association of Attorneys General; and the Transportation External Coordinating Working Group.

For several years, EM has been a leader among federal agencies in involving the public in budget formulation. In addition, EM and the EM sites conduct regular public meetings on issues of public interest.

IV. FY 2000 Budget Structure

In FY 1999, EM established a new budget structure that more closely aligns with EM's goals of accelerating cleanup and moving to project-based management. This structure is intended to continue to improve EM's ability to track progress and costs and provide a more understandable reporting structure. There are three fundamental elements to this structure:

- Organizing work into 'projects' (which are described in Project Baseline Summaries);
- Using program accounts which focus on site closure, site/project completion, and post 2006 completion; and
- Aligning performance measures (metrics) by project to meet the intent and requirements of the Government Performance and Results Act.

The budget structure continues to categorize projects according to their specific appropriations -- Defense Facilities Closure Projects, Defense Environmental Restoration and Waste Management, Defense Environmental Management Privatization, Non-Defense Environmental Management, and the Uranium Enrichment Decontamination and Decommissioning Fund.

Beginning with the FY 2000 Congressional Budget Request, the budget narrative is written to the project baseline summary level, within each program and appropriation account. This is a departure from the organization of the FY 1999 request, which was presented by performance measure/major activity and which provided crosscut information regarding the projects. Although the narrative discussion now focuses on the projects, crosscut information is provided in the 'Ancillary Tables' section of this Executive Budget Summary, which includes information such as funding estimates by performance metric, funding by installation, etc

A. Project Baseline Summaries

As mentioned previously, for the FY 2000 budget request, EM has identified more than 390 projects (as described in Project Baseline Summaries) that include (1) defined scopes, schedules, and costs; (2) budget data; (3) performance data; and, (4) compliance and safety and health data. The EM program has also aggregated the budget and performance data for each site to demonstrate the results that will be accomplished for the resources requested.

B. Program Accounts: Focus on Accelerating and Completing Cleanup

EM's three budget program accounts reflect near-term goals and emphasis on completion.

- **Site Closure.** This account provides funding for completing cleanup and closing down facilities with no enduring Federal presence on-site, except for stewardship activities. The Site Closure account under the Defense Appropriation includes the Rocky Flats site in Colorado, and the Fernald, Miamisburg, Columbus, and Ashtabula sites in Ohio. In the Non-Defense Appropriation, the Site Closure account includes the Grand Junction, CO, Weldon Spring, MO; West Valley, NY; Columbus, OH; and Miamisburg, OH sites,

as well as the UMTRA-Groundwater sites in various states. The Department has established a goal of completing cleanup at the sites in this account by the end of 2006

- **Site/Project Completion.** This account provides funding for environmental management projects that are expected to be completed by 2006 at (1) EM sites where overall site cleanup will not be fully accomplished by 2006; and (2) DOE sites where all EM projects will be completed by 2006 (except for long-term stewardship activities), but where there will be a continuing federal workforce at the site to carry out enduring non-EM missions, such as support of nuclear weapons activities or scientific research, and the necessary waste management activities to handle newly-generated wastes from these missions. This account includes projects and sites under the following Operations Offices: Albuquerque, Chicago, Idaho, Oakland, Richland, and Savannah River.

  In a limited number of cases, sites have been placed in the Site/Project Completion account even though there is no expectation of a continuing mission after cleanup is completed. In these instances, use of the Site Closure account would have created an additional appropriation control for an Operations/Field office with a limited amount of associated funding, thereby hindering managerial flexibility in the execution of projects at these sites.

- **Post 2006 Completion.** This account provides funding for projects that are expected to require work beyond FY 2006. This includes projects at the Albuquerque, Idaho, Nevada, Oak Ridge, Richland, and Savannah River Operations Offices, as well as the Waste Isolation Pilot Plant in Carlsbad, New Mexico, and multi-site and Headquarters activities.

  This account includes efforts at the largest Department sites, where operations have been carried out over a long period of time and associated cleanup will also take longer to complete.

C. Government Performance and Results Act Implementation

The EM program has been actively involved in incorporating the requirements of the Government Performance and Results Act into its planning, budgeting, and management systems. The Act requires: (1) Strategic Plans that articulate each program's fundamental missions and provide long-term, general goals for implementing the missions; (2) Annual Performance Plans that provide the direct link between the longer-term goals outlined in the Strategic Plan and what managers do on a day-to-day basis; and (3) Annual Performance Reports that describe the program results for the resources expended and how well the previous year's Annual Performance Plan goals were met.

The EM program is making progress in implementing the intent and requirements of the Government Performance and Results Act. Specific areas of emphasis include the following:

- EM will establish FY 1999 Management Commitments for each Operations/Field Office that are based on a roll-up of the Project Baseline Summary performance goals and selected key milestones reported in the FY 2000 budget request. These commitments will be used as a management tool for assessing program performance and results during Headquarters/Field periodic status reviews.

- The EM program will focus on improving the accuracy and completeness of its performance measures data. In particular, the life-cycle quantity estimates for the

measures (i.e., cubic meters of waste disposed) will be further refined and improved to set the near-term performance goals within the appropriate context of the total environmental work scope to be accomplished. EM will continue to manage using the Corporate Performance Measures (i.e., release site completions, facilities decommissioned, waste disposed, etc.) to demonstrate quantifiable progress towards completion of EM's geographic sites.

- The EM program will continue to improve its effectiveness and efficiency. To reduce the costs of EM's massive cleanup effort, the program continues to seek opportunities to accelerate cleanup without jeopardizing the safety of workers, communities, or the environment. By implementing enhanced performance, EM will be able to accelerate cleanup and closure schedules, and thereby lower life-cycle cleanup costs. EM has established accelerated site closure targets for the Rocky Flats Environmental Technology Site (from 2010 to 2006), the Fernald Environmental Management Project (from 2008 to 2005), and Miamisburg Environmental Management Project (from 2005 to 2004).

  EM has identified several enhanced performance mechanisms that are expected to result in improvements to productivity and/or accelerated site closure

  - Acceleration of Technology Deployment -- Introducing less expensive and/or more effective cleanup technologies,
  - Integration -- Identifying better ways to transfer and manage wastes among sites;
  - Project Sequencing -- Completing projects with high "up-keep" costs;
  - Contract Reform -- Creating incentives for contractors to improve performance (quality results and accelerated completion), and
  - Lessons Learned -- Increasing productivity based on lessons learned.

V. Transfer of Responsibilities

There are no new transfers of responsibility between EM and other Departmental programs reflected in the FY 2000 budget request. However, the Office of Environment, Safety and Health will manage the health studies program using funding appropriated or requested under the Defense Environmental Restoration and Waste Management appropriation (consistent with FY 1999). In addition, the DOE Office of Science manages the solicitation of proposals and the scientific review process, in partnership with the EM Science Program.

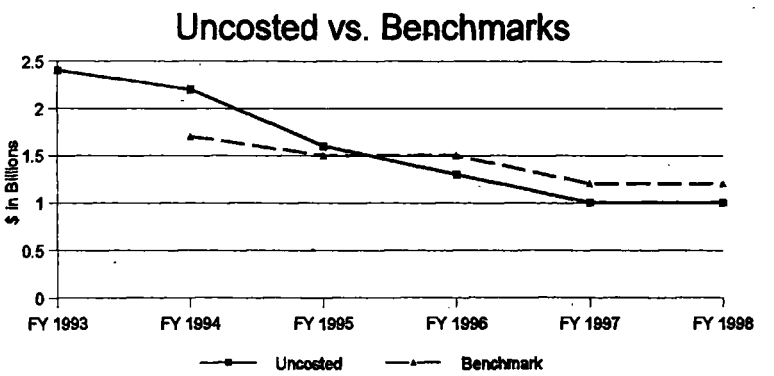
VI. Prior Year Balances

Prior year uncosted obligations exist when funds are legally obligated on a contract, subcontract, or purchase order, but the work has not yet been performed and the funds have not been costed or liquidated. These funds are commonly referred to as uncosted balances. Over the past several years, the Department has made significant progress in reducing the level of uncosted balances. In fact, as reflected in the Department's "Report on Uncosted Balances for Fiscal Year Ended September 30, 1997", issued to

Congress on March 16, 1998, "the Department's total uncosted balance is the lowest it has been in over 16 years."

The EM program has made a significant contribution towards reducing uncosted balances. Although some uncosted balances are a necessary business practice, the challenge is to define how much is enough. In FY 1996, EM established benchmarks (reasonable levels to carry over from one fiscal year to the next) as a tool to define the point at which greater scrutiny must be applied to ensure that uncosted balances are not excessive. In FY 1997, the Department adopted percentage thresholds which are applied consistently across all Departmental programs

EM's uncosted balances were well below the Department's thresholds in FY 1997. For example, the EM actual uncosted carryover for FY 1997 was $1.01 billion, over $200 million below the Department's guidelines. This trend continued through FY 1998 with an ending uncosted balance of $1.006 billion, well below the Department's threshold of $1.2 billion. EM is continuing to monitor its uncosted balances to improve funds management to ensure that uncosted balances carried forward to the next fiscal year are as low as practical and obligated on essential work scope/activities. The following chart depicts the historical trend of EM's uncosted balances versus the established benchmarks.



(dollars in billions)

	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
Uncosted	2.4	2.2	1.6	1.3	1.0	1.0
Benchmark	n/a	1.7	1.5	1.5	1.2	1.1

VII. Environmental Management Corporate Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts.

EM managers have developed specific corporate measures to link planning goals with the budget, program execution, and evaluation of program performance and results. The EM corporate performance measures demonstrate tangible environmental results towards completing cleanup (or achieving the intended end state) at the remaining geographic sites. These corporate performance measures include:

- Volume of waste treated and disposed by waste type
- Number of release sites cleaned up
- Number of facilities deactivated
- Number of facilities decommissioned
- Quantity of nuclear material and spent nuclear fuel stabilized and prepared for disposition
- Number and type of alternative technology deployments

The summary-level performance measures reflected in the FY 2000 budget request are based upon the project-level performance measures contained in the Project Baseline Summaries. The corporate performance measures also include crosscutting measures related to health and safety, contracting, and stakeholder trust and confidence. The linkage between the projects' performance measures and EM's budget request will enable EM, the Congress, and others to track, on an annual basis, EM's progress towards its commitments, as well as progress towards project and geographic site completion.

The FY 2000 budget request presents performance measures data at the Project Baseline Summary level and at various roll-up levels to demonstrate key program accomplishments and results at EM's projects and sites. Each project includes a list of the corporate performance measures applicable to the project for FY 1998, FY 1999, and FY 2000. While a significant number of EM's projects have quantifiable corporate performance measures, not all projects have work scope associated with these measures. Some of the reasons why a project does not contain any corporate measures for the budget profile years include: work on the project has not yet begun; work is in progress and has not yet been completed; and the project is for landlord, infrastructure, or construction activities that do not have measures. The project baseline summary narrative provides a description of the project's activities, measures, and work scope to fully address planned and actual accomplishments and results.

A. Geographic Site Completions

The Department is implementing strategies to accomplish DOE's Environmental Quality strategic objective to "*clean up as many as possible of the Department's 53 remaining contaminated geographic sites by 2006.*" At the ten remaining sites after 2006, including our five largest sites, treatment will continue for the remaining 'legacy' waste streams. Fifty-three geographic sites remained to be cleaned up as of the beginning of FY 1998 (this number included the addition of the Waste Isolation Pilot Plant, which is a disposal site). Five geographic sites were completed during FY 1998, leaving a total of 48 geographic sites to be cleaned up as of the beginning of FY 1999.

A geographic site is considered 'complete' (or at its end state) when.

- Deactivation or decommissioning of all facilities currently in the EM program has been completed, excluding any long-term surveillance and monitoring;
- All releases to the environment have been cleaned up in accordance with agreed-upon cleanup standards;
- Groundwater contamination has been contained, or long-term treatment or monitoring is in place;
- Nuclear material and spent fuel have been stabilized and/or placed in safe long-term storage; and
- 'Legacy' waste (i.e., waste produced by past nuclear weapons production activities, with the exception of high-level waste) has been disposed of in an approved manner.

FY 2000 Geographic Site Completions

In FY 2000, EM plans to complete three geographic sites, increasing the total completed to 71 of the 113 geographic sites in the EM program. These completions reflect 24 of the 24 Uranium Mill Tailings Remedial Action surface project sites (two of these sites were delisted at the request of the State of North Dakota); all of the 25 Formerly Utilized Sites Remedial Action Project sites (per Congressional direction, the remaining Formerly Utilized Sites Remedial Action Project sites were transferred to the Army Corps of Engineers for remediation at the beginning of FY 1998); and 22 other sites, leaving 42 sites to be cleaned up. The three planned geographic site completions in FY 2000 are:

- Argonne National Laboratory-West in Idaho;
- General Atomics Site in California; and,
- Battelle Columbus Laboratory King Avenue Site in Ohio.

Geographic Site Completion Progress

- In FY 1999, EM plans to complete the following three geographic sites, bringing the number of completed geographic sites to 68:
  - Ames Laboratory in Iowa;
  - Sandia National Laboratory in California; and,
  - Princeton Plasma Physics Laboratory in New Jersey.
- In FY 1998, EM completed the following five geographic sites, bringing the number of completed geographic sites to 65:
  - Center for Energy and Environmental Research in Puerto Rico; and,
  - Completed remedial action at the final two Uranium Mill Tailings Remedial Action surface project sites (Naturita and Maybell in Colorado) and revoked the designation of the two North Dakota sites (Belfield and Bowman) from the project.

B. Cleanup

EM has also demonstrated and will continue to demonstrate significant cleanup progress through the completion of remediation at numerous "release sites" and "facilities" at the various geographic sites, ultimately leading to the completion of an entire geographic site. Release sites represent discrete areas of contamination at a particular site, and facilities are contaminated structures.

Remedial actions/release site cleanup, facility deactivation, and facility decommissioning are further defined as follows:

- *Remedial Action/Release Site Cleanup* -- Remedial actions are taken to identify and contain or remove soil and ground water contamination to prevent it from spreading. Remedial action/release site cleanups are conducted at inactive waste sites or facilities where releases or spills have occurred and contamination has been released into the environment. Completion of release site assessments are also tracked to show interim cleanup results.
- *Facility Deactivation* -- Deactivation activities minimize the risks, hazards, and associated costs at facilities and make those facilities available for potential re-use or eventual decontamination and decommissioning. These activities can include material handling and movement activities. The intent, however, is not to achieve an end point for the material, but to remove the material with the goal of readying the facility/system for the preferred end state.
- *Facility Decommissioning* -- Decommissioning involves the decontamination and/or dismantlement and removal of nuclear facilities that are no longer active and pose a risk to public health or the environment. Decommissioning operations range from small cleanup activities involving portions of buildings to complete structural dismantlement Completion of facility assessments are also tracked to show interim decommissioning results.

FY 2000 Performance Goals for Cleanup

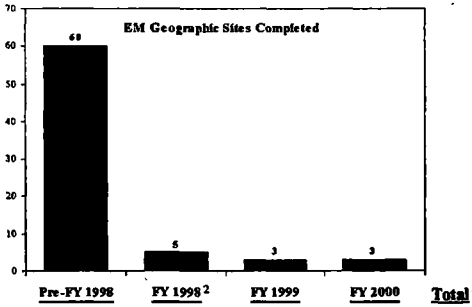
- Release Site Assessments and Cleanups
  - Complete approximately 760 release site assessments.
  - Complete approximately 200 release site cleanups, increasing the total number of release sites completed to more than 4,400 out of a total inventory of approximately 9,700 release sites.
- Facility Deactivation and Decommissioning
  - Deactivate approximately 60 facilities.
  - Complete approximately 345 facility decommissioning assessments.
  - Decommission 110 facilities, increasing the total number of facilities decommissioned to more than 600 out of a total inventory of approximately 3,300 facilities.

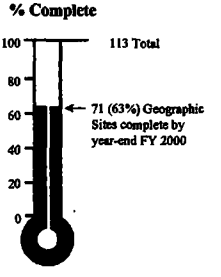
Cleanup Progress

- Release Site Assessments and Cleanups
  - Complete approximately 310 release site assessments in FY 1999; and completed 583 release site assessments in FY 1998.
  - Complete approximately 165 release site cleanups in FY 1999; and completed 290 release site cleanups in FY 1998
- Facility Deactivation and Decommissioning
  - Deactivate approximately 65 facilities in FY 1999; and deactivated 70 facilities in FY 1998.

- Complete approximately 120 facility decommissioning assessments in FY 1999; and completed 89 facility decommissioning assessments in FY 1998.
- Decommission approximately 80 facilities in FY 1999; and decommissioned 108 facilities in FY 1998.

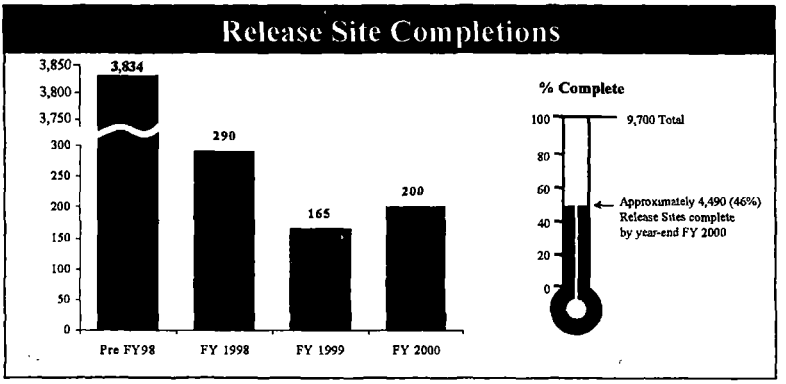
Geographic Site Completions

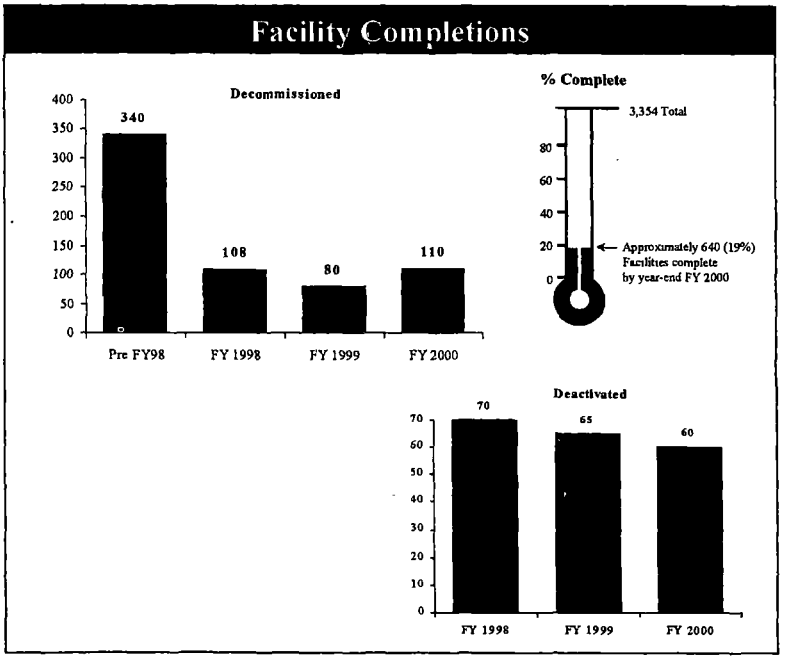




	Pre-FY 1998	FY 1998[2]	FY 1999	FY 2000	Total[3]
End of Year Remaining[1]	53	48	45	42	113
Cumulative Completions[2]	60	65	68	71	

1. 53 geographic sites remained to be cleaned up at the beginning of FY1998 (this includes the addition of WIPP which is a disposal site).
2. Completions include two UMTRA sites Belfield and Bowman, ND The desgnation of these sites as UMTRA sites was revoked in FY1998.
3. Excludes 21 FUSRAP sites transferred to the U.S. Army Corps of Engineers in FY 1998.


Release Site Completions
3,850
3,800
3,750
300
250
200
150
100
50
0
3,834
290
165
200
Pre FY98
FY 1998
FY 1999
FY 2000
% Complete
100
80
60
40
20
0
9,700 Total
Approximately 4,490 (46%)
Release Sites complete
by year-end FY 2000


Facility Completions
Decommissioned
400
350
300
250
200
150
100
50
0
340
108
80
110
Pre FY98
FY 1998
FY 1999
FY2000
% Complete
3,354 Total
80
60
40
20
0
Approximately 640 (19%)
Facilities complete
by year-end FY 2000
Deactivated
70
65
60
70
60
50
40
30
20
10
0
FY 1998
FY 1999
FY 2000

C. Waste Treatment, Storage, and Disposal

The Department is implementing strategies to accomplish DOE's Environmental Quality strategic objective to, *"safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs and make defense high level radioactive wastes disposal-ready."* Listed below are long-term and near-term goals for managing the radioactive waste types: high-level waste, transuranic waste, low-level waste, and mixed low-level waste. EM issued the Waste Management Programmatic Environmental Impact Statement Records of Decision for Hazardous Waste Treatment and Transuranic Waste Storage and Treatment in FY 1998 and continued to resolve issues related to the issuance of Records of Decision for High-Level Waste Storage and Low-Level and Mixed Low-Level Waste Treatment and Disposal These Records of Decision will help define the storage, treatment, and disposal facilities for waste management activities. EM developed initial disposition maps to show the planned pathways to move waste or materials from inventory or generation through required processing to treatment or stabilization and on to final disposition. In addition, DOE will examine areas where consolidation of facilities can occur to reduce overall programmatic costs.

- *High-Level Waste* -- High-level waste is highly-radioactive waste material resulting from the reprocessing of spent nuclear fuel, including the liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. The waste is stored largely as a liquid or sludge, with some waste in the form of calcine. The long-term objective for high-level waste management is disposal in a licensed geologic repository. High-level waste is made disposal-ready through treatment to produce canisters of vitrified waste. The Department is currently vitrifying liquid high-level waste at the Defense Waste Processing Facility at the Savannah River Site in South Carolina, and the West Valley Demonstration Project in New York. Work will also continue for the privatization of high-level waste treatment at the Hanford Site in Washington and solidification of liquid to a calcine form at the Idaho National Engineering and Environmental Laboratory.

- *Transuranic Waste* -- Transuranic waste is radioactive waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for a) high-level radioactive waste; b) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or c) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61. Approximately 98% of DOE's transuranic waste is stored at six major sites: the Los Alamos National Laboratory, the Rocky Flats Environmental Technology Site, the Oak Ridge National Laboratory, the Hanford Site, the Idaho National Engineering and Environmental Laboratory, and the Savannah River Site. The long-term goal is to dispose of all defense-related transuranic waste in the Waste Isolation Pilot Plant in New Mexico.

- *Mixed Low-Level Waste* -- Mixed low-level waste consists of both hazardous (as defined by the Resource Conservation and Recovery Act) and radioactive (as defined by the Atomic Energy Act) components and is not high-level or transuranic waste. The long-term goal for mixed low-level waste is to develop the necessary treatment and disposal capacity needed to dispose of the existing inventory as well as any newly generated waste. The near-term goal for mixed waste is to complete site selection for disposal facilities and optimize the treatment configuration outlined in the site treatment plans.
- *Low-Level Waste* -- Low-level waste is radioactive waste, including accelerator-produced waste that is not high-level waste, radioactive waste, transuranic waste, spent nuclear fuel, byproduct material (as defined under the Atomic Energy Act of 1954), or naturally occurring radioactive material. Low-level waste is currently disposed at Los Alamos National Laboratory, the Idaho National Engineering and Environmental Laboratory, and the Savannah River, Oak Ridge, Nevada, and Hanford sites. The Nevada and Hanford sites also accept low-level waste from other sites in the DOE Complex. The Savannah River Site accepts a small volume of low-level waste from the Naval Reactors Program. The near-term and long-term goals of the low-level waste management program are to continue to dispose of low-level waste at a pace to eliminate currently stored low-level waste and match generation of new waste.

In addition to the waste type measures listed above, EM also reports the quantity of hazardous waste disposed and the volume of remediation waste generated. While not EM Corporate Performance Measures, hazardous waste and remediation waste activities are reported in the budget by Project Baseline Summary, where applicable.

The safe storage, treatment and disposal of waste ensures that these materials do not pose unacceptable risk to the public, workers, or the environment. Waste management activities support completion of EM's geographic sites and will ultimately enable many of EM's sites to be made available for other beneficial uses.

FY 2000 Performance Goals for Waste Management

Specific performance goals for managing the treatment, storage (i.e., FY 2000 year-end inventory), and disposal of the Department's waste in FY 2000 include:

- High-Level Waste
  - Treat approximately 1,400 cubic meters of high-level waste.
  - Store approximately 355,000 cubic meters of high-level waste.
  - Produce approximately 105 canisters of high-level waste:
    - At the Defense Waste Processing Facility at the Savannah River Site, vitrify approximately 100 canisters of high-level waste This completes about 15% of the total canisters that will be produced at Savannah River from FY 1996 to life-cycle completion.
    - Continue processing high-level waste tank heels at the West Valley Demonstration Project to produce up to 5 canisters of high-level waste in FY 2000. This

completes more than 90% of the total canisters that will be produced at West Valley from FY 1996 to life-cycle completion.

- Transuranic Waste
  - Treat approximately 600 cubic meters of transuranic waste.
  - Store approximately 109,000 cubic meters of transuranic waste.
  - Make disposal-ready and ship to the Waste Isolation Pilot Plant in Carlsbad, New Mexico, approximately 3,400 cubic meters of transuranic waste. Shipment of transuranic waste to the Waste Isolation Pilot Plant is contingent upon resolution of pending litigation, and for mixed-waste, timely receipt of the Resource Conservation and Recovery Act Part B Permit. This is about 2% of the total transuranic waste that requires disposal between FY 1998 and FY 2070.
- Mixed Low-Level Waste
  - Treat approximately 10,000 cubic meters of mixed low-level waste.
  - Store approximately 34,000 cubic meters of mixed low-level waste.
  - Dispose of approximately 15,000 cubic meters of mixed low-level waste.
- Low-Level Waste
  - Treat approximately 9,000 cubic meters of low-level waste.
  - Store approximately 213,000 cubic meters of low-level waste.
  - Dispose of approximately 79,000 cubic meters of low-level waste.

Waste Management Progress

Examples of progress in managing our waste include:

- High-Level Waste Treatment and Disposal-Ready
  - Treat approximately 1,500 cubic meters of high-level waste in FY 1999; and treated 2,411 cubic meters of high-level waste in FY 1998.
  - Produce approximately 215 canisters of high-level waste in FY 1999; and produced 331 canisters of high-level waste in FY 1998. Specifically:
    - EM expects to produce up to 200 canisters of vitrified high-level waste at the Defense Waste Processing Facility at Savannah River in FY 1999; and produced 250 vitrified high-level waste canisters in FY 1998.
    - EM expects to produce up to 15 canisters of vitrified high-level waste at the West Valley Demonstration Project in FY 1999; and produced 81 canisters of vitrified high-level waste in FY 1998.
- Transuranic Waste Treatment and Disposal
  - Treat approximately 350 cubic meters of transuranic waste in FY 1999; and treated 90 cubic meters of transuranic waste in FY 1998.

- Make disposal-ready and ship to the Waste Isolation Pilot Plant approximately 700 cubic meters of transuranic waste in FY 1999; and made disposal-ready 229 cubic meters of transuranic waste in FY 1998. Shipment of transuranic waste to the Waste Isolation Pilot Plant is contingent upon resolution of pending litigation, and for mixed waste, timely receipt of the Resource Conservation and Recovery Act Part B permit.

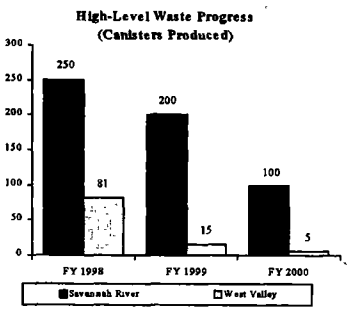
- Mixed Low-Level Waste Treatment and Disposal
  - Treat approximately 11,000 cubic meters of mixed low-level waste in FY 1999; treated 11,048 cubic meters of mixed low-level waste in FY 1998.
  - Dispose of approximately 15,000 cubic meters in FY 1999; disposed of 10,727 cubic meters of mixed low-level waste in FY 1998.
- Low-Level Waste Treatment and Disposal
  - Treat approximately 21,000 cubic meters of low-level waste in FY 1999; treated 15,375 cubic meters of low-level waste in FY 1998.
  - Dispose of approximately 73,000 cubic meters in FY 1999; disposed of 29,762 cubic meters of low-level waste in FY 1998.

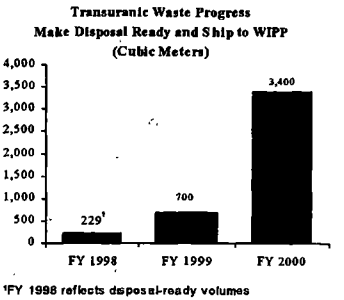
Other significant examples of progress in managing our waste include:

- Declared the Waste Isolation Pilot Plant geologic repository ready for operations for transuranic waste disposal in FY 1998; disposal operations of non-mixed transuranic waste are expected to begin in FY 1999; a permit for receipt and disposal of mixed transuranic waste is also expected to be received in FY 1999
- The Los Alamos National Laboratory received certification from the Carlsbad Area Office and the Environmental Protection Agency to dispose of transuranic waste at the Waste Isolation Pilot Plant. Both the Idaho National Engineering and Environmental Laboratory and Rocky Flats Environmental Technology Site received certification from the Carlsbad Area Office, and are in the process of receiving approval from the Environmental Protection Agency, to dispose of transuranic waste at the Waste Isolation Pilot Plant.
- Authorized commencement of the Tank Waste Remediation System contract Phase 1B at Hanford in August 1998, for treatment of between 6% and 13% of the high-level waste.
- Began site development and construction of support facilities and began Immobilized Low Activity Waste and Immobilized High Activity Waste storage facility projects at Hanford to support privatization
- Completed 16 Tank Characterization Reports at Hanford, meeting all required Defense Nuclear Facilities Safety Board Recommendation 93-5, Tank Waste Characterization Studies, commitments for FY 1998.
- Started operations of the Waste Receiving and Processing facility transuranic waste processing line at Hanford in FY 1998.

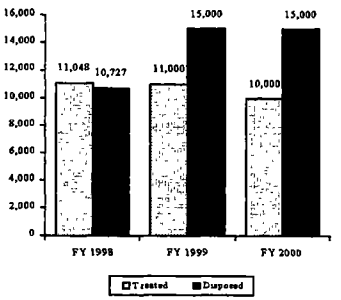
- Closed the Unreviewed Safety Question for organic complexants at Hanford, resolved safety issues, and took 18 organic complexant tanks off the watch list in FY 1998; also closed the flammable gas Unreviewed Safety Question for double-shell and single-shell tanks at Hanford.
- Completed the tank farm cross-site transfer line at Hanford in FY 1998.
- Started or resumed interim stabilization of three tanks at Hanford in FY 1998, expect to start interim stabilization of four additional Hanford tanks in FY 1999.
- Began operation of the Replacement High-Level Waste Evaporator at Savannah River to assist in achieving space gain of 2.9 million gallons (FY 1999) in the tank farm through evaporation of waste.
- Closed a second high-level radioactive waste tank at Savannah River in FY 1998.
- Completed calcining the remaining non-sodium bearing waste at Idaho, four months ahead of the Idaho Settlement Agreement milestone.
- Awarded contract and began Phase I of the Advanced Mixed Waste Treatment Project at the Idaho National Engineering and Environmental Laboratory to treat DOE mixed transuranic and low-level waste.
- Awarded the Oak Ridge transuranic waste treatment privatization contract and broad spectrum contracts for mixed low-level waste treatment in FY 1998.
- Completed Phase I vitrification at the West Valley Demonstration Project in FY 1998, ahead of schedule and under budget; 500,000 curies are expected to be transferred from the tank farms to the vitrification facility in FY 1999.
- Negotiated a Joint Federal/State Oversight Agreement of the Low-Level Waste Disposal Program with the State of Nevada in FY 1998.
- Completed design and construction of the Waste Management Facility upgrade at the Argonne National Laboratory-East in FY 1998.
- Issued Records of Decision for the treatment and storage of transuranic waste and for treatment of hazardous waste based on the Waste Management Programmatic Environmental Impact Statement in FY 1998; Records of Decision for low-level and mixed low-level waste treatment and disposal are expected to be issued in FY 1999.

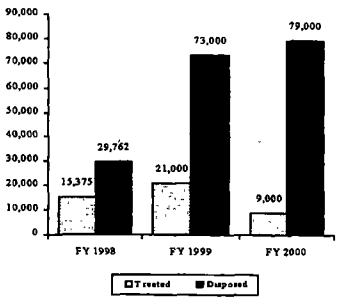
Waste Management Progress





¹FY 1998 reflects disposal-ready volumes





D. Pollution Prevention

The Department is implementing initiatives to accomplish DOE's Environmental Quality strategic objective to *"prevent future pollution"* in accordance with the Department-wide pollution prevention goals issued by the Secretary on May 3, 1996. The goals require the Department to reduce routine waste generation by 50 percent (for hazardous, mixed, and radioactive wastes) by December 31, 1999, based upon 1993 baseline rates.

For FY 2000 and beyond, EM will shift its emphasis from routine waste prevention to reducing waste that results from cleanup, stabilization, and decommissioning activities. The annual goal for this waste reduction is 10 percent, from annual planned baseline volumes. The Department plans to change its way of managing the Pollution Prevention Program in FY 2000 by shifting more responsibility from Headquarters to the field. Funds for the Headquarters-controlled National Pollution Prevention Program project baseline summary will be reduced. The field will provide resources to implement many of the activities funded by the National Pollution Prevention Program in prior years. Examples include activities required to comply with Executive Orders and DOE Orders, technical support to waste generators to identify opportunities, implementing high return-on-investment projects, tracking pollution prevention progress and reporting results to Headquarters The purpose of this program shift is to integrate Pollution Prevention into the Department's operating culture.

E. Nuclear Material and Spent Nuclear Fuel Stabilization

Stabilizing, monitoring, and maintaining the large quantity of nuclear material and spent nuclear fuel is one of the most urgent tasks in the EM program. Nuclear material stabilization activities support the DOE Environmental Quality strategic objective to *"reduce the most serious risks from the environmental legacy of the U.S. nuclear weapons complex first."* The Department must stabilize these materials and fuel (i.e., produce a safer chemical and/or physical form of the material) to reduce the level of potential risks such as exposure to radiation, contamination of people and the environment, and critical events. Stabilization converts nuclear material to a stable form suitable for storage, either safe interim or long-term depending upon the programmatic plans for the material. Stabilization means that something (processing from a liquid to a solid form, processing to remove activated waste streams, repackaging, etc.) must be done to the nuclear material so that they pose significantly less risk to workers, the public, and/or the environment. Nuclear material will be stabilized in the F-Canyon, FB-Line, H-Canyon, and HB-Line at Savannah River, the Plutonium Finishing Plant at Richland, and in several facilities at the Rocky Flats Environmental Technology Site. These activities have been prioritized so that the most serious risks are addressed first. Milestones have also been developed for the management of spent nuclear fuel including both DOE-owned fuels, as well as foreign research reactor fuels being returned to the United States for non-proliferation purposes. These fuels will be treated, where necessary, packaged suitably for final disposal where practicable, and placed in interim dry storage. Further, as nuclear material and spent fuel are placed in a more stable (i.e., lower risk) form, the physical plant (i.e., buildings, production systems, machinery, and utilities) can be deactivated.

The performance measures for nuclear material and spent nuclear fuel focus on the amount of nuclear material *stabilized* and subsequently *made disposition-ready* while awaiting final disposition.

Nuclear Material

- *Stabilization* encompasses activities where the intent is to convert nuclear material to a stable form suitable for storage, either safe interim or long-term, depending upon the programmatic plans for the material. This includes staging, preparation, and operations actions. These actions are taken to both manage and reduce risks. The following types of nuclear material will be reported under "stabilization": Plutonium Solution (liters); Plutonium Residue (kilograms bulk); Plutonium Metal/Oxides (containers); Uranium Solution (liters); Uranium in Other Forms (kilograms bulk); Other Nuclear Material in Solution Form (liters); and Other Nuclear Material in Other Forms (handling units).
- *Material Made Disposition-Ready.* "Disposition-ready" materials are prepared for transportation, long-term storage, or final disposition. The amount of material provided represents the material's post-stabilization (treatment) weight, mass, volume, or number of containers The following types of nuclear material will be reported under "disposition-ready": Plutonium Metal/Oxides or in Other Forms (containers); Uranium Solution (liters); Uranium in Other Forms (kg bulk); Other Nuclear Material in Solution Form (liters); and Other Nuclear Material in Other Forms (containers).

Spent Nuclear Fuel. Spent nuclear fuel includes fuel, targets, and slugs.

- *Stabilization.* Spent nuclear fuel stabilization encompasses activities where the intent is to treat, where necessary, spent nuclear fuel to a safe, stable state to a point where it can be made disposition ready, including all staging and preparation actions. These actions are taken to both manage and reduce risks.
- *Disposition Ready.* Spent nuclear fuel is prepared as best as known practices will allow for transportation, long-term storage, or final disposal. Activities under "disposition ready" may include repackaging/movement of stabilized spent fuel from wet to dry storage; technology development for disposal; and repackaging of fuel to meet storage standards and criteria.

FY 2000 Performance Goals for Nuclear Material and Spent Nuclear Fuel Stabilization

The existing performance measures for nuclear material and spent nuclear fuel were revised during FY 1998 to resolve classified data reporting issues and to more completely quantify progress in nuclear material and spent nuclear fuel stabilization These updated performance measures are reported below.

- Nuclear Material Stabilized
  - Stabilize approximately 160 liters of plutonium solution
  - Stabilize approximately 38,000 kilograms bulk of plutonium residue.
  - Stabilize approximately 238 containers of plutonium metal/oxides.
  - Stabilize approximately 9 kilograms bulk of uranium in other forms.
  - Stabilize approximately 430 handling units of other nuclear material in other forms.
- Nuclear Material Made Disposition-Ready
  - Make disposition-ready approximately 910 containers of plutonium metal/oxides/other
  - Make disposition-ready approximately 85,600 liters of uranium solution

- Make disposition-ready approximately 2 containers of other nuclear material in other forms

- Spent Nuclear Fuel Stabilized and Made Disposition-Ready
  - Stabilize approximately 53.1 metric tons of heavy metal of spent nuclear fuel
  - Make disposition-ready approximately 0 005 metric tons of heavy metal of spent nuclear fuel
  - Make disposition-ready approximately 0 016 cubic meters of spent nuclear fuel

Nuclear Material Stabilization Progress

Examples of progress in managing nuclear material for FY 1998 and FY 1999 include:

- Nuclear Material Stabilized
  - Stabilize approximately 40 liters of plutonium solution in FY 1999; stabilized 3,035 liters of plutonium solution in FY 1998
  - Stabilize approximately 33,000 kilograms bulk of plutonium residue in FY 1999; stabilized 5,004 kilograms bulk of plutonium residue in FY 1998.
  - Stabilize approximately 332 containers of plutonium metal/oxides/other in FY 1999; stabilized 80 containers of plutonium metal/oxides/other in FY 1998.
  - Stabilize approximately 78 kilograms bulk of uranium in other forms in FY 1999.
  - Stabilize approximately 460 handling units of other nuclear material in other forms in FY 1999; stabilized 147 handling units of other nuclear material in other forms in FY 1998.
- Nuclear Material Made Disposition-Ready
  - Make disposition-ready approximately 2 containers of plutonium metal/oxides in FY 1999, made disposition-ready 2 containers of plutonium metal/oxides in FY 1998.
  - Make disposition-ready approximately 7 kilograms bulk of uranium in other forms in FY 1999
  - Make disposition-ready approximately 23 containers of other nuclear material in other forms in FY 1999; made disposition-ready 3 containers in FY 1998.

Spent Nuclear Fuel Stabilization Progress

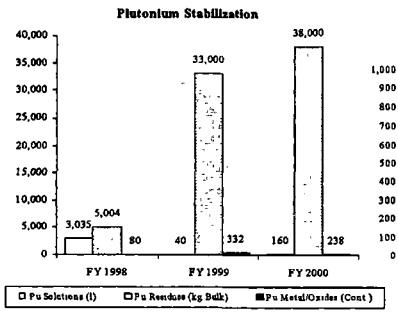
Examples of progress in managing spent nuclear fuel for FY 1998 and FY 1999 include:

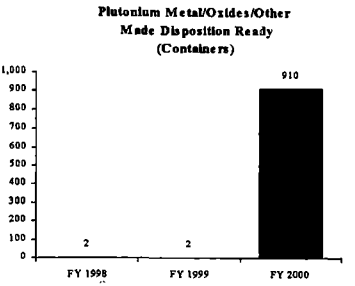
- Spent Nuclear Fuel Stabilized and Made Disposition Ready
  - Stabilize approximately 6.015 metric tons of heavy metal of spent nuclear fuel in FY 1999; stabilized 0.753 metric tons of heavy metal of spent nuclear fuel in FY 1998.
  - Stabilize approximately 0.132 cubic meters of spent nuclear fuel in FY 1999; stabilized 0.332 cubic meters of spent nuclear fuel in FY 1998.
  - Make disposition-ready 0.091 metric tons of heavy metal of spent nuclear fuel in FY 1998.
  - Make disposition-ready approximately 16.282 cubic meters of spent nuclear fuel in FY 1999; made disposition-ready 12 028 cubic meters of spent nuclear fuel in FY 1998.

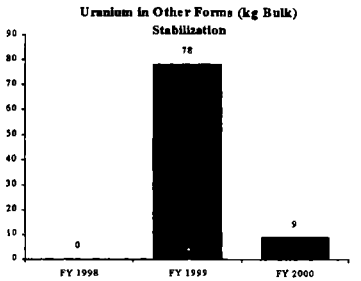
Other significant examples of progress in nuclear material and spent nuclear fuel stabilization include:

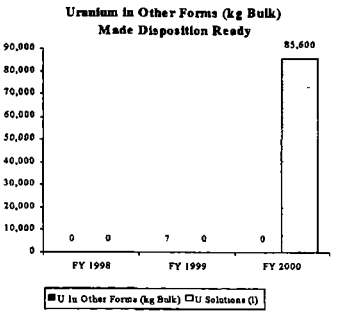
- Drained two areas in Building 371; drained and removed 2 liquid piping systems in Building 771; and stabilized or repackaged 5,004 kg plutonium-bearing residues at the Rocky Flats Environmental Technology Site in Colorado in FY 1998.
- Completed DOE's first shipment of spent fuel from Asia via the Concord Naval Weapons Station in California to the Idaho National Engineering and Environmental Laboratory in FY 1998.
- In support of the U.S. non-proliferation policy, completed the transport and receipt of four shipments of foreign research reactor spent nuclear fuel from approximately ten countries to the Savannah River Site in South Carolina in FY 1998.
- Drain and remove 12 liquid systems in Building 771 at the Rocky Flats Environmental Technology Site in FY 1999.
- Drain 10 areas in Building 371 at the Rocky Flats Environmental Technology Site in FY 1999.
- Begin transferring spent nuclear fuel from wet storage in the Test Area North-607 pool at Idaho to the interim dry storage facility in FY 1999.
- Complete the first cross-country shipment of foreign research reactor Training, Research Irradiation Reactors from General Atomics spent nuclear fuel from Europe to the Idaho National Engineering and Environmental Laboratory via the Charleston Naval Weapons Station in FY 1999.
- Begin stabilization of plutonium oxide at the Plutonium Finishing Plan at the Hanford Site in Washington in FY 1999.
- Complete removal of spent nuclear fuel from Facility 7823 on the Oak Ridge Reservation in Tennessee in FY 1999.

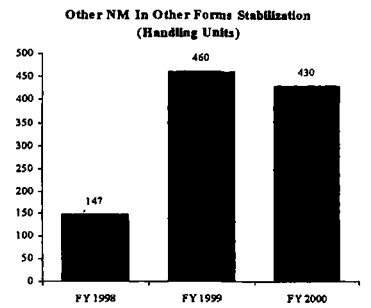
Progress in Nuclear Material Stabilization

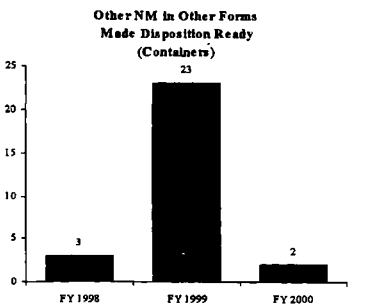




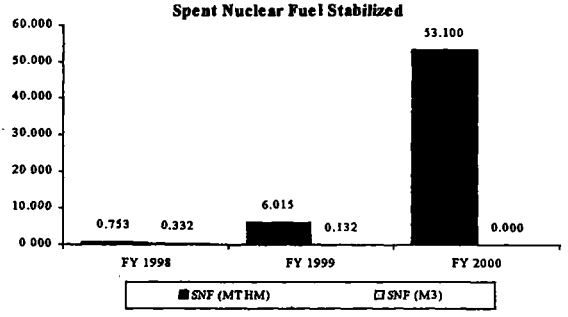


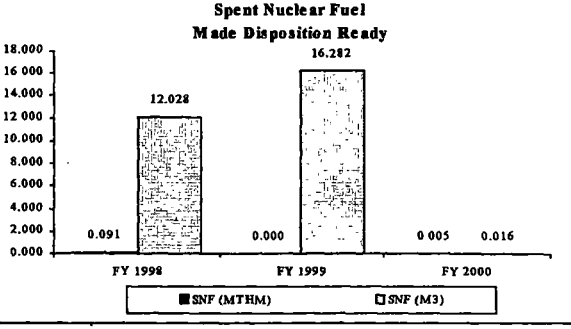






Progress in Spent Nuclear Fuel Stabilization





F. Technology Development and Deployment

EM is implementing initiatives for developing and deploying alternative environmental cleanup, nuclear waste, and spent fuel treatment technologies that reduce cost, resolve currently intractable problems, and/or are more protective of workers and the environment. Developing and deploying alternative technologies supports the DOE Environmental Quality strategic objective to *"reduce the life-cycle costs of environmental cleanup."* EM's technology development efforts in FY 2000 concentrate on five major focus areas: (1) Mixed Waste; (2) Tank Waste Remediation; (3) Subsurface Contaminants; (4) Deactivation and Decommissioning; and (5) Plutonium. EM's measures for assessing technology development and deployment progress are:

- Number of alternative technologies demonstrated -- Technologies or systems that meet the performance-specification-based needs as identified by the Site Technology Coordinating Groups
- Number of alternative technologies ready for implementation -- Technologies or systems with cost and engineering performance data.
- Number of alternative technology deployments -- Deployment is the use of a technology or technology system toward accomplishment of one or more site-specific DOE EM program cleanup objectives as applied to the actual waste requiring management at the site.

FY 2000 Performance Goals for Technology

Specific performance goals for technology development and deployment for FY 2000 include.

- Technology Development and Deployment
  - Demonstrate 30 alternative technology systems that meet the performance-specification-based needs as identified by the Site Technology Coordinating Groups.
  - Make 30 environmental technology systems ready for implementation with cost and engineering performance data.
  - Accomplish 60 alternative technology deployments A goal of 60 deployments is established based on the current rate of technology deployments. Historically, it has proven difficult to quantify longer-term performance goals for deployments due to the nature of the technology work scope and variations in timing and magnitude of the deploying EM program's work scope.

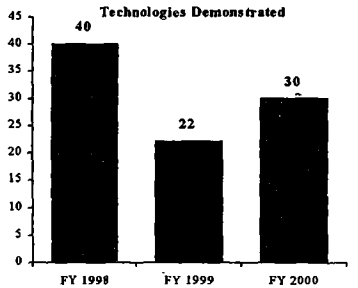
Technology Progress

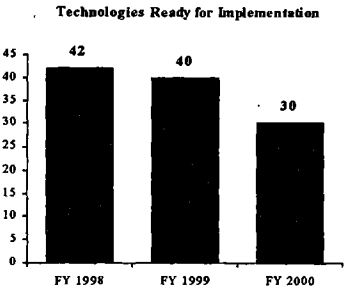
Examples of progress in Technology Development and Deployment during FY 1998 and FY 1999 include:

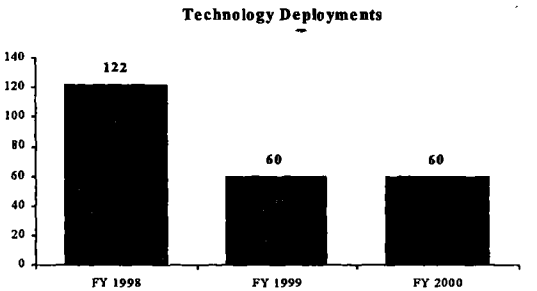
- Initiated a deployment support effort designed to incentivize widespread use of available cost- and schedule-reducing alternative technologies, thereby accelerating cleanup and maximizing cost avoidance. More than 30 accelerated site technology deployment projects have been competitively selected in FY 1999 Fourteen high-potential deployment projects were competitively selected and initiated in FY 1998.

- Demonstrate 22 alternative technology systems that meet Site Technology Coordination Group-identified needs in FY 1999. Demonstrated 40 alternative technology systems in FY 1998, including technologies for use in retrieving solid waste from the Hanford Tanks that remains after the liquid waste has been removed.
- Make 40 alternative technology systems ready for implementation in FY 1999. Made 42 alternative technology systems ready for implementation with cost and engineering performance information in FY 1998, including a sensor that measures the direction and force of groundwater flow, providing valuable information on groundwater movement which is critical in locating and designing, and monitoring waste disposal sites.
- Accomplish 60 innovative technology deployments in FY 1999. Deployed alternative technologies in 122 instances during cleanup projects in FY 1998.
- Solicited, peer reviewed and awarded new EM Science Program grants in the areas of Deactivation and Decommissioning and High-Level Waste in FY 1998. This basic longer-term research is aimed at DOE's most intractable problems.

Progress in Technology Development and Deployment







NOTES
1. FY 1999 is based on the FY 1999 Appropriation
2. FY 2000 is based on the FY 2000 Request. The goal of 60 deployments is established based on the current rate of technology deployments.

G. Corporate Performance Measures - EM Program Totals

This section provides corporate performance measures aggregated to a total EM program level. These roll-ups are supported by detailed information included within the FY 2000 Budget that depict performance measures and goals for FY 1998, FY 1999, and FY 2000. The budget details are provided by appropriation, program account (e g., Site Closure, Site/Project Completion, and Post 2006 Completion), Operations/Field Office (and/or site), and Project Baseline Summary performance measures. EM will continue to improve its performance-based budgeting process and the quality of its performance data over the coming year.

Please note the following when reviewing the tables which follow:

- **Release Sites/Facilities:** The sequence and priority in which release sites and facilities at each geographic site are cleaned up vary. The level of effort and resources required to complete EM's release sites and facilities depend upon the urgency, complexity, risk, size of the particular release site and/or facility, and a variety of other factors. Some areas require more characterization and some facilities are much more difficult to cleanup than others. Typically, the simpler release site/facilities are cleaned up first, leaving the more complicated (and generally more costly) activities for later. These more complex areas/facilities may take several years to complete and may also require more time due to resource constraints. Therefore, comparisons between release sites and facility completions both within a particular site, across sites, and from year-to-year, will not provide a good indicator of program progress.
- **Waste:** These tables focus on high-level, transuranic, mixed low-level, and low-level waste progress. Hazardous waste and/or other waste accomplishment data are not reflected in these summary tables. However, in most cases, they are included in the supporting budget narratives. Volume of waste "stored" values represent the inventory status as of the last day of the fiscal year for the "FY 1998 Actual", the "FY 1999 Planned", and "FY 2000 Planned".

Corporate Performance Measures - EM Program Totals [a]

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Release Sites and Facilities				
Number of Completed Release Site Assessments	583	313	761	n/a
Number of Release Site Completions	290	165	201	6,362
Number of Completed Facility Decommissioning Assessments	89	122	346	n/a
Number of Facilities Decommissioned	108	81	110	3,092
Number of Facilities Deactivated	70	65	60	1,928
Waste Treatment, Storage and Disposal				
Volume of High-Level Waste Treated (m^3)	2,411	1,528	1,439	1,495,343
Volume of High-Level Waste Stored (m^3)	342,062	342,645	355,034	n/a
Number of High-Level Waste Canisters Produced	331	215	105	5,344-5,384
Volume of Transuranic Waste Treated (m^3)	90	358	657	136,017
Volume of Transuranic Waste Stored (m^3)	107,339	110,408	109,470	n/a
Volume of Transuranic Waste Disposed at a DOE Site (m^3) [b]	0	1,320	3,376	174,562
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [c]	229	748	3,462	86,356
Volume of Mixed Low-Level Waste Treated (m^3)	11,048	11,009	10,310	199,747
Volume of Mixed Low-Level Waste Stored (m^3)	61,128	46,752	34,913	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	10,727	15,591	15,447	306,741
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	159	1,033	116	13,607
Volume of Low-Level Waste Treated (m^3)	15,375	21,559	9,839	1,467,847
Volume of Low-Level Waste Stored (m^3)	242,675	212,435	213,909	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	29,762	73,520	79,043	2,090,363
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	9,727	16,911	17,418	149,011
Nuclear Material and Spent Nuclear Fuel				
Nuclear Material Stabilized - Pu Solution (l)	3,035	40	160	38,300
Nuclear Material Stabilized - Pu Residue (kg bulk)	5,004	32,887	38,470	107,588
Nuclear Material Stabilized - Pu Metal/Oxides (Containers)	80	332	238	4,264
Nuclear Material Stabilized - U Solution (l)	0	0	0	0
Nuclear Material Stabilized - U in Other Forms (kg bulk)	0	78	9	96
Nuclear Material Stabilized - Other NM in Solution Form (l)	0	0	0	34,192
Nuclear Material Stabilized - Other NM Forms (Handling Units)	147	459	432	18,867
Nuclear Material Made Disposition-Ready - Pu Metal/Oxides/Other (Containers)	2	2	910	1,800
Nuclear Material Made Disposition-Ready On-site - U Solution (l)	0	0	85,608	2,450,604

[a] Life-cycle estimates for release sites, facilities, nuclear material, and spent nuclear fuel are from FY 1997 through FY 2070. Waste type estimates are from FY 1998 through FY 2070, with the exception of high-level waste canisters produced which are from FY 1996 through FY 2070. Life-cycle estimates will be updated in the Spring 1999 update of EM's corporate database.

[b] Reflects the disposal capability at the Waste Isolation Pilot Plant located in Carlsbad, New Mexico.

[c] FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Nuclear Material Made Ready Ship Off-site - U Solution (l)	0	0	0	0
Nuclear Material Made Disposition-Ready On-site - U in Other Forms (kg bulk)	0	7	0	1,860,000
Nuclear Material Made Disposition-Ready Ship Off-site-U in Other Forms (kg bulk)	204,002	4,386,000	2,609,000	TBD
Nuclear Material Made Disposition-Ready - Other NM Solution (l)	0	0	0	492
Nuclear Material Made Disposition-Ready - Other Forms of NM (Containers)	3	23	2	n/a
Spent Nuclear Fuel Stabilized (MTHM)	0.753	6.015	53.100	2,477.000
Spent Nuclear Fuel Stabilized (m^3)	0.332	0.132	0.000	n/a
Spent Nuclear Fuel Made Disposition-Ready (MTHM)	0.091	0.000	0.005	n/a
Spent Nuclear Fuel Made Disposition-Ready (m^3)	12.028	16.282	0.016	n/a
Spent Nuclear Fuel in Disposition-Ready Storage (MTHM)	0.000	0.151	0.197	28.600
Spent Nuclear Fuel in Disposition-Ready Storage (m^3)	0.000	0.256	0.675	28.900
Number of Innovative Technology Deployments	122	60	60	n/a

VIII. ANCILLARY TABLES

Environmental Management
Funding by Installation

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Albuquerque			
Albuquerque Operations Office	18,120	8,080	5,550
Grand Junction Office	47,573	42,613	31,700
Kansas City Plant	3,513	1,756	1,100
Los Alamos National Laboratory	131,315	81,574	110,834
Lovelace Biomedical & Environmental Research Institute	789	478	481
Pantex Plant	23,243	11,299	15,000
Pinellas Plant	2,318	2,797	5,500
Sandia National Laboratories	48,368	27,260	19,435
UMTRA - Groundwater	5,559	5,902	13,000
UMTRA - Surface	35,936	20,782	0
Total, Albuquerque	316,734	202,541	202,600
Carlsbad	173,700	185,404	186,404
Chicago			
Ames Laboratory	363	306	260
Argonne National Laboratory-East	15,921	18,170	19,761
Argonne National Laboratory-West	3,630	1,142	809
Brookhaven National Laboratory	26,137	30,001	29,553
Chicago Operations Office	435	1,101	644
Princeton Plasma Physics Laboratory	3,290	3,343	3,073
Total, Chicago	49,776	54,063	54,100
Idaho			
Idaho National Engineering & Environmental Laboratory *	415,556	435,642	409,422
Nevada			
Nevada Operations Office	3,933	7,036	8,634
Nevada Test Site	64,985	73,045	76,673
Total, Nevada	68,918	80,081	85,307

* The Idaho Program for FY 2000 also includes the use of $43 million in prior year balances for Pit 9 activities, for a total program level of $452.422 million.

	(dollars in thousands)		
	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Oak Ridge			
Oak Ridge National Laboratory	49,439	59,677	57,805
Oak Ridge Off-Site Locations	53,131	22,516	23,839
Oak Ridge Operations Office	5,027	8,809	10,930
Oak Ridge Reservation	290,340	275,957	310,987
Paducah Gaseous Diffusion Plant	39,582	35,983	37,500
Portsmouth Gaseous Diffusion Plant	43,053	35,119	37,500
Weldon Spring Site	66,686	63,500	52,000[a]
Total, Oak Ridge	547,258	501,561	530,561
Oakland			
Energy Technology Engineering Center	17,625	16,494	17,398
General Atomics	4,280	2,030	1,100
General Electric	0	313	500
Laboratory for Energy-Related Health Research	6,802	4,389	3,863
Lawrence Berkeley National Laboratory	9,265	10,668	11,098
Lawrence Livermore National Laboratory	54,210	49,214	49,891
Oakland Operations Office	2,279	2,700	1,100
Separations Process Research Unit	0	0	500
Stanford Linear Accelerator Center	1,006	1,000	1,400
Total, Oakland	95,467	86,808	86,850
Ohio			
Ashtabula	14,637	15,405	15,405
Columbus	12,567	12,125	16,134
Fernald	258,700	274,002	280,589
Miamisburg	86,622	88,949	93,353
Ohio Field Office	0	94	94
West Valley	113,746	107,353	107,353
Total, Ohio	486,272	497,928	512,928
Richland			
Hanford Site	906,861	953,001	1,028,280
Richland Operations Office	44,536	45,491	36,831
Total, Richland	951,397	998,492	1,065,111
Rocky Flats			
Rocky Flats Environmental Technology Site	611,303	638,397	637,132
Rocky Flats Field Office	20,797	18,803	20,078
Total, Rocky Flats	632,100	657,200	657,210

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63.5 million. The program will work to identify funding sources for this important activity.

	(dollars in thousands)		
	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Savannah River			
Savannah River Operations Office	28,117	33,157	30,280
Savannah River Site	1,099,806	1,181,789	1,192,220
Total, Savannah River	1,127,923	1,214,946	1,222,500
D&D Fund Deposit	388,000	398,088	420,000
Uranium/Thorium Reimbursement	40,000	30,000	30,000
Multi-Site	113,053	85,542	77,098
Program Direction	345,000	337,073	349,409
Science and Technology	269,213	243,156	230,500
Subtotal, EM	6,020,367	6,008,525	6,120,000
FFTF (transferred to Nuclear Energy in FY 1999)	41,727	0	0
Y2K Supplemental Appropriation	0	13,840	0
Use of Prior Year Balances	-11,253	-20,658	0
D&D Fund Deposit (Offset)	-388,000	-398,088	-420,000
Total, Traditional Budget Authority	5,662,841	5,603,619	5,700,000
Privatization	200,000	228,357	228,000
Total, EM	5,862,841	5,831,976	5,928,000

Environmental Management
Defense Environmental Management Privatization

(dollars in thousands)

	FY 1998 Comparable Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Carlsbad Area Office			
Remote-Handled Transuranic Waste	21,000	19,605	0
Idaho Operations Office			
Spent Nuclear Fuel Dry Storage	27,000	20,000	5,000
Advanced Mixed Waste Treatment	0	87,252	110,000
Subtotal, Idaho	27,000	107,252	115,000
Oak Ridge Operations Office			
On-Site Disposal Facility	5,000	33,500	20,000
Transuranic Waste Treatment	0	0	12,000
Subtotal, Oak Ridge	5,000	33,500	32,000
Richland Operations Office			
Tank Waste Remediation System	115,000	100,000	106,000
Savannah River Operations Office			
Spent Nuclear Fuel Transfer and Storage	25,000	0	0
Undistributed [a]	7,000	0	0
Subtotal, Defense EM Privatization	200,000	260,357	253,000
Use of Prior Year Balances	0	-32,000	-25,000
Total, Defense EM Privatization	200,000	228,357	228,000

[a] The distribution specified in the National Defense Authorization Act for Fiscal Year 1998 did not provide for distribution of $7 million.

Funding Estimates by Performance Measure [a]

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Release Sites			
Assessment	182,420	97,828	121,799
Cleanup	544,298	564,040	535,019
Disposal Facility (Design/Construction/Operation)	18,720	37,569	41,161
Groundwater Remediation	70,211	94,338	111,902
Potentially Responsible Party Payments	8,253	1,804	1,944
Post-Remediation Long-Term Surveillance & Maintenance	12,944	18,624	22,947
Provision of Alternative Water Supply	4,658	4,217	4,312
Facility Decommissioning			
Assessment	19,337	17,468	15,704
Cleanup	166,848	170,595	203,944
Pre-Decommissioning Surveillance & Maintenance	39,784	35,841	38,805
All Other Waste Types [b]			
All Other Waste Types	73,260	85,691	92,616
Construction	8,339	1,032	440
Hazardous Waste			
Construction	9,185	1,650	700
DOE On-Site Disposal	46,844	35,121	34,180
High-Level Waste			
Canisters Produced	0	30,753	29,553
Construction	51,003	91,462	53,628
Storage	329,625	333,404	389,160
Treatment (includes TWRS privatization)	505,145	374,043	418,008
Low-Level Waste			
Construction	5,542	817	2,840
On-Site/Commercial Disposal	55,463	25,763	24,186
Ship to DOE Disposal	13,187	28,951	31,900
Storage	38,335	33,844	42,225
Treatment	68,222	44,371	28,883

[a] This table presents the total estimated budget authority by performance measure category (e.g., Transuranic Waste, Release Sites, Nuclear Material Stabilization, etc.) and "other" activities (e.g., operational activities, etc.) *below* the Project Baseline Summary level. The table reflects only an estimate of the budget authority associated with key program activities related to waste management, remediation, facility deactivation, and nuclear material and spent nuclear fuel stabilization. The budget authority provided for these performance measures and "other" activities are estimates only and are therefore not of auditable quality. The total budget authority reported for each Project Baseline Summary in the main line budget is of audit quality consistent with EM's project-based management approach.

[b] Includes waste that is not classified as high-level waste, transuranic waste, hazardous waste, low-level waste, or mixed low-level waste.

	(dollars in thousands)		
	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
Mixed Low-Level Waste			
Construction	7,240	2,355	420
On-Site/Commercial Disposal	55,287	62,899	79,146
Ship to DOE Disposal	67	2,679	3,318
Storage	60,738	39,961	52,094
Treatment	146,276	97,578	91,864
Transuranic Waste			
Construction	2,043	1,569	2,100
On-Site/Commercial Disposal	195,723	207,031	187,629
Ship to DOE Disposal	4,388	9,953	9,951
Storage	86,336	76,309	89,768
Treatment	20,027	127,081	158,496
Facility Deactivation			
Construction	2,400	0	0
Deactivation	80,177	64,609	40,015
Post-Deactivation Long-Term Monitoring	13,246	10,819	15,271
Surveillance & Maintenance	117,529	136,388	143,222
Nuclear Materials			
Construction	21,136	93,550	20,860
Stabilization	465,542	496,663	561,990
Spent Nuclear Fuel			
Construction	21,744	40,794	41,396
Surveillance & Maintenance	208,615	214,729	257,963
Stabilization	129,662	97,749	73,998
Science & Technology			
Risk Policy	7,000	9,000	5,000
Science Program	46,109	47,000	32,000
Technology	216,104	187,156	193,500
Operational Activities			
Agreements in Principle/Grants	24,553	16,903	15,498
UE D&D Fund Deposit	388,000	398,088	420,000
Intergovernmental Affairs	6,800	5,800	6,970
Landlord	693,479	750,288	694,876
Other Project-Related Bridge Costs	0	11,556	19,861
Security Investigations	0	4,806	9,446
Technical Support	492,587	489,564	465,866
Technical Training & Education	1,000	900	961
Uranium Leasing	342	1,406	400
Uranium/Thorium Reimbursement	40,000	30,000	30,000

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Current Appropriation	FY 2000 Request
National Programs			
Analytical Management	5,205	3,000	3,000
Emergency Preparedness	3,259	3,218	2,849
Environmental & Regulatory Analysis	1,501	518	300
Packaging Certification	4,648	3,756	3,716
Pollution Prevention	24,472	12,890	7,238
Program Direction	345,000	337,073	349,409
Transportation & Packaging Management	10,509	11,918	11,753
Subtotal, EM (including Privatization)	6,220,367	6,236,882	6,348,000
Use of Prior Year Balances	-11,253	-20,658	0
Y2K Supplemental Appropriation	0	13,840	0
FFTF (transferred to Nuclear Energy in FY99)	41,727	0	0
D&D Fund Deposit (Offset)	-388,000	-398,088	-420,000
Total, EM	5,862,841	5,831,976	5,928,000

EM Corporate Performance Measures [a]

Operations/Field Office Totals

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Albuquerque				
Number of Completed Release Site Assessments	73	9	14	n/a
Number of Release Site Completions	89	29	43	1,093
Number of Completed Facility Decommissioning Assessments	0	0	10	n/a
Number of Facilities Decommissioned	5	4	13	153
Number of Facilities Deactivated	0	0	0	4
Volume of Transuranic Waste Treated (m^3)	0	0	0	23,005
Volume of Transuranic Waste Stored (m^3)	9,168	9,142	9,142	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [b]	194	0	0	9,168
Volume of Mixed Low-Level Waste Treated (m^3)	74	0	0	2,334
Volume of Mixed Low-Level Waste Stored (m^3)	527	381	302	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	141	79	53	4,729
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	1	0	0	144
Volume of Low-Level Waste Treated (m^3)	82	30	30	6,153
Volume of Low-Level Waste Stored (m^3)	998	0	0	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	1,314	0	0	6,410
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	575	0	0	3,889
Carlsbad				
Volume of Transuranic Disposed at a DOE Site (m^3) [c]	0	1,320	3,376	174,562
Chicago				
Number of Completed Release Site Assessments	24	14	5	n/a
Number of Release Site Completions	20	8	14	117
Number of Completed Facility Decommissioning Assessments	23	0	1	n/a
Number of Facilities Decommissioned	8	2	11	56
Volume of Transuranic Waste Treated (m^3)	11	85	85	970
Volume of Transuranic Waste Stored (m^3)	90	92	94	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [b]	0	2	2	142
Volume of Mixed Low-Level Waste Treated (m^3)	41	31	31	2,460
Volume of Mixed Low-Level Waste Stored (m^3)	155	157	153	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	3	11	18	2,110

[a] Life-cycle estimates for release sites, facilities, nuclear material, and spent nuclear fuel are from FY 1997 through FY 2070. Waste type estimates are from FY 1998 through FY 2070, with the exception of high-level waste canisters produced which are from FY 1996 through FY 2070. Life-cycle estimates will be updated in the Spring 1999 update of EM's corporate database.

[b] FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

[c] Reflects the available disposal capacity at the Waste Isolation Pilot Plant in Carlsbad, New Mexico

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	0	0	0	96
Volume of Low-Level Waste Treated (m^3)	619	1,053	1,051	94,901
Volume of Low-Level Waste Stored (m^3)	334	214	81	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	118	174	228	27,832
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	425	574	492	32,507
Idaho				
Number of Completed Release Site Assessments	15	38	58	n/a
Number of Release Site Completions	7	11	43	155
Number of Completed Facility Decommissioning Assessments	2	5	15	n/a
Number of Facilities Decommissioned	4	8	11	212
Number of Facilities Deactivated	1	1	1	53
Volume of High-Level Waste Treated (m^3)	760	732	1,041	146,688
Volume of High-Level Waste Stored (m^3)	9,367	9,062	8,085	n/a
Volume of Transuranic Waste Treated (m^3)	0	0	0	61,724
Volume of Transuranic Waste Stored (m^3)	65,000	64,990	63,975	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [a]	0	10	1,015	30,000
Volume of Mixed Low-Level Waste Treated (m^3)	226	113	113	13,822
Volume of Mixed Low-Level Waste Stored (m^3)	1,714	1,123	697	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	13	50	50	3,788
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	21	0	0	1,072
Volume of Low-Level Waste Treated (m^3)	3,690	5,200	1,464	185,852
Volume of Low-Level Waste Stored (m^3)	6,035	2,000	3,385	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	3,264	6,500	4,329	93,885
Volume of Low-Level Waste Shipped to DOE Disposal Site(m^3)	2	0	0	TBD
Spent Nuclear Fuel Stabilized (MTHM)	0.510	6.000	53.100	346.000
Nevada				
Number of Completed Release Site Assessments	34	64	18	n/a
Number of Release Site Completions	31	34	37	1,675
Number of Facilities Decommissioned	1	0	0	1
Number of Facilities Deactivated	0	0	0	7
Volume of Transuranic Waste Treated (m^3)	78	91	180	TBD
Volume of Transuranic Waste Stored (m^3)	671	671	394	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [a]	0	0	277	676
Volume of Mixed Low-Level Waste Treated (m^3)	13	0	0	15
Volume of Mixed Low-Level Waste Stored (m^3)	13	0	0	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	264	0	0	264
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	11,059	37,742	64,164	412,892

[a] FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Ohio [a]				
Number of Completed Release Site Assessments	3	3	4	n/a
Number of Release Site Completions	3	0	7	150
Number of Completed Facility Decommissioning Assessments	23	8	14	n/a
Number of Facilities Decommissioned	22	11	15	148
Number of Facilities Deactivated	38	6	13	139
Volume of High-Level Waste Treated (m^3)	780	100	50	396,612
Volume of High-Level Waste Stored (m^3)	182	82	32	n/a
Number of High-Level Waste Canisters Produced	81	15	5	260-300
Volume of Transuranic Waste Treated (m^3)	0	0	0	792
Volume of Transuranic Waste Stored (m^3)	775	779	783	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [b]	0	0	0	247
Volume of Mixed Low-Level Waste Treated (m^3)	150	9	12	409
Volume of Mixed Low-Level Waste Stored (m^3)	168	147	142	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	1	532	13	TBD
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	0	0	0	523
Volume of Low-Level Waste Treated (m^3)	0	1,500	1,000	TBD
Volume of Low-Level Waste Stored (m^3)	45,023	20,442	17,405	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	106	10,016	428	TBD
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	2,649	8,895	9,293	TBD
Nuclear Material Made Disposition-Ready - Pu Metal/Oxides/Other (Containers)	2	2	0	n/a
Nuclear Material Made Disposition-Ready On-site - U in Other Forms (kg bulk)	0	7	0	n/a
Nuclear Material Made Disposition-Ready Ship Off-site - U in Other Forms (kg bulk)	204,002	4,386,000	2,609,000	n/a
Nuclear Material Made Disposition-Ready - Other Forms of NM (Containers)	2	23	2	n/a
Oakland				
Number of Completed Release Site Assessments	35	8	16	n/a
Number of Release Site Completions	23	8	16	195
Number of Completed Facility Decommissioning Assessments	4	2	0	n/a
Number of Facilities Decommissioned	5	1	2	41
Number of Facilities Deactivated	0	0	0	118
Volume of Transuranic Waste Treated (m^3)	0	0	2	1,187
Volume of Transuranic Waste Stored (m^3)	301	309	307	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [b]	0	0	2	1,133
Volume of Mixed Low-Level Waste Treated (m^3)	213	150	265	8,556
Volume of Mixed Low-Level Waste Stored (m^3)	639	724	807	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	269	203	149	1,751

[a] In addition to the Corporate Performance Measures listed above, the Ohio Field Office plans to dispose on-site or commercially remediation wastes generated as a result of remedial action and decontamination and decommissioning activities totaling 221,871 cubic meters in FY 1999 and 148,227 cubic meters in FY 2000.

[b] FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	4	1	0	1,335
Volume of Low-Level Waste Treated (m^3)	173	61	53	6,203
Volume of Low-Level Waste Stored (m^3)	6,064	6,165	5,084	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	214	1,446	242	23,429
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	3,304	1,863	1,983	43,566
Oak Ridge				
Number of Completed Release Site Assessments	42	90	189	n/a
Number of Release Site Completions	46	28	17	733
Number of Completed Facility Decommissioning Assessments	3	15	304	n/a
Number of Facilities Decommissioned	5	8	2	446
Number of Facilities Deactivated	0	0	10	36
Volume of Transuranic Waste Treated (m^3)	1	0	0	3,346
Volume of Transuranic Waste Stored (m^3)	2,348	2,389	2,545	n/a
Volume of Mixed Low-Level Waste Treated (m^3)	3,002	4,139	2,019	82,349
Volume of Mixed Low-Level Waste Stored (m^3)	38,506	23,945	18,964	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	3,511	11,830	6,014	109,417
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	133	1,032	116	10,254
Volume of Low-Level Waste Treated (m^3)	3,399	2,298	2,446	779,223
Volume of Low-Level Waste Stored (m^3)	156,425	159,966	162,071	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	3,344	1,946	2,537	249,243
Volume of Low-Level Waste Shipped to DOE Disposal Site(m^3)	104	2,949	3,600	2,305
Nuclear Material Stabilized - Other NM in Solution Form (l)	0	0	0	492
Nuclear Material Stabilized - Other NM Forms (Handling Units)	0	0	0	8
Nuclear Material Made Disposition-Ready - Other NM Solution (l)	0	0	0	492
Nuclear Material Made Disposition-Ready -Other Forms of NM (Containers)	1	0	0	4
Spent Nuclear Fuel Stabilized (MTHM)	0.013	0.015	0.000	1.000
Spent Nuclear Fuel Stabilized (m^3)	0.032	0.132	0.000	n/a
Spent Nuclear Fuel Made Disposition-Ready (MTHM)	0.091	0.000	0.005	n/a
Spent Nuclear Fuel Made Disposition-Ready (m^3)	0.056	0.031	0.016	n/a
Spent Nuclear Fuel In Disposition-Ready Storage (MTHM)	0.000	0.151	0.177	n/a
Spent Nuclear Fuel In Disposition-Ready Storage (m^3)	0.000	0.256	0.605	n/a
Rocky Flats				
Number of Completed Release Site Assessments	18	13	15	n/a
Number of Release Site Completions	2	2	2	175
Number of Completed Facility Decommissioning Assessments	34	92	2	n/a
Number of Facilities Decommissioned	12	9	33	727
Number of Facilities Deactivated	2	8	0	290
Volume of Transuranic Waste Treated (m^3)	0	0	0	804
Volume of Transuranic Waste Stored (m^3)	1,849	4,209	4,214	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) *	35	670	2,000	9,531

* FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Volume of Mixed Low-Level Waste Treated (m^3)	4,126	4,886	6,575	35,437
Volume of Mixed Low-Level Waste Stored (m^3)	8,114	7,999	3,873	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	6,527	2,886	6,575	78,874
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	0	0	0	165
Volume of Low-Level Waste Treated (m^3)	0	0	0	40
Volume of Low-Level Waste Stored (m^3)	9,576	8,614	11,178	n/a
Volume of Low-Level Waste Shipped to DOE Disposal Site (m^3)	2,669	2,630	2,050	65,028
Nuclear Material Stabilized - Pu Solution (l)	3,035	0	0	TBD
Nuclear Material Stabilized - Pu Residue (kg bulk)	5,004	32,662	36,480	99,742
Nuclear Material Made Disposition-Ready - Pu Metal/Oxides/Other (Containers)	0	0	910	1,800
Richland				
Number of Completed Release Site Assessments	276	46	417	n/a
Number of Release Site Completions	9	32	16	1,699
Number of Facilities Decommissioned	46	38	23	1,306
Number of Facilities Deactivated	29	50	36	971
Volume of High-Level Waste Treated (m^3)	0	0	0	194,183
Volume of High-Level Waste Stored (m^3)	204,000	207,000	221,000	n/a
Volume of Transuranic Waste Treated (m^3)	0	182	390	20,712
Volume of Transuranic Waste Stored (m^3)	16,300	16,300	16,400	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) [a]	0	22	131	18,749
Volume of Mixed Low-Level Waste Treated (m^3)	22	608	500	40,329
Volume of Mixed Low-Level Waste Stored (m^3)	9,171	10,000	8,815	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	0	0	2,525	99,084
Volume of Low-Level Waste Treated (m^3)	12	0	0	41,656
Volume of Low-Level Waste Stored (m^3)	180	180	180	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	5,920	6,120	3,880	471,796
Nuclear Material Stabilized - Pu Solution (l)	0	40	160	4,300
Nuclear Material Stabilized - Pu Residue (kg bulk)	0	0	600	3,550
Nuclear Material Stabilized - Pu Metal/Oxides (containers)	0	238	238	3,140
Nuclear Material Stabilized - U in Other Forms (kg bulk)	0	78	9	96
Nuclear Material Made Disposition-Ready On-site - U in Other Forms (kg bulk)	0	0	0	1,860,000
Spent Nuclear Fuel Stabilized (MTHM)	0.230	0.000	0.000	2,130.000
Spent Nuclear Fuel Stabilized (m^3)	0.300	0.000	0.000	n/a
Spent Nuclear Fuel In Disposition-Ready Storage (MTHM)	0.000	0.000	0.020	28.600
Spent Nuclear Fuel In Disposition-Ready Storage (m^3)	0.000	0.000	0.070	28.900
Savannah River				
Number of Completed Release Site Assessments	63	28	25	n/a
Number of Release Site Completions	60	13	6	370
Number of Facilities Decommissioned	0	0	0	2

[a] FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

	FY 1998 Actual	FY 1999 Planned	FY 2000 Planned	Life-cycle
Number of Facilities Deactivated	0	0	0	310
Volume of High-Level Waste Treated (m^3)	871	696	348	757,860
Volume of High-Level Waste Stored (m^3)	128,513	126,501	125,917	n/a
Number of High-Level Waste Canisters Produced	250	200	100	5,084
Volume of Transuranic Waste Treated (m^3)	0	0	0	23,417
Volume of Transuranic Waste Stored (m^3)	10,837	11,527	11,616	n/a
Volume of Transuranic Waste Shipped to DOE Disposal Site (m^3) *	0	44	35	16,710
Volume of Mixed Low-Level Waste Treated (m^3)	3,183	1,073	795	14,036
Volume of Mixed Low-Level Waste Stored (m^3)	2,121	2,276	1,160	n/a
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	0	0	50	6,672
Volume of Mixed Low-Level Waste Shipped to DOE Disposal Site (m^3)	0	0	0	18
Volume of Low-Level Waste Treated (m^3)	7,400	11,417	3,795	353,429
Volume of Low-Level Waste Stored (m^3)	18,040	14,854	14,525	n/a
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	4,423	9,576	3,235	803,185
Nuclear Material Stabilized - Pu Solution (l)	0	0	0	34,000
Nuclear Material Stabilized - Pu Residue (kg bulk)	0	225	1,390	4,296
Nuclear Material Stabilized - Pu Metal/Oxides (Containers)	80	94	0	1,124
Nuclear Material Stabilized - Other NM in Solution Form (l)	0	0	0	33,700
Nuclear Material Stabilized - Other NM Forms (Handling Units)	147	459	432	18,859
Nuclear Material Made Disposition-Ready On-site - U Solution (l)	0	0	85,608	2,450,604
Spent Nuclear Fuel Made Disposition-Ready (m^3)	11.972	16.251	0.000	n/a

* FY 1999 and FY 2000 reflect disposal-ready volumes and shipments to the Waste Isolation Pilot Plant. FY 1998 reflects disposal-ready volumes only.

Fiscal Year 1998
Corporate Performance Measures
EM Program Totals (Planned vs. Actual) [a]

	(performance measures)			
	FY 1998 Planned	FY 1998 Actual	Variance	% Variance
Number of Completed Release Site Assessments	575	583	8	1%
Number of Release Site Completions	281	290	9	3%
Number of Completed Facility Decommissioning Assessments	90	89	-1	-1%
Number of Facilities Decommissioned	71	108	37	52%
Number of Facilities Deactivated	63	70	7	11%
Volume of High-Level Waste Treated (m^3)	4,194	2,411	-1,783	-43%
Volume of High-Level Waste Stored (m^3)	361,213	342,062	-19,151	-5%
Number of High-Level Waste Canisters Produced	288	331	43	15%
Volume of Transuranic Waste Treated (m^3)	255	90	-165	-65%
Volume of Transuranic Waste Stored (m^3)	108,211	107,339	-872	-1%
Volume of Transuranic Disposed at a DOE Site (m^3)	388 to 592	0	-388 to -592	-100%
Volume of Mixed Low-Level Waste Treated (m^3)	6,611	11,048	4,437	67%
Volume of Mixed Low-Level Waste Stored (m^3)	49,335	61,128	11,793	24%
Volume of Mixed Low-Level Waste Disposed On-site or Commercially (m^3)	8,194	10,727	2,533	31%
Volume of Low-Level Waste Treated (m^3)	22,117	15,375	-6,742	-30%
Volume of Low-Level Waste Stored (m^3)	117,262	242,675	125,413	107%
Volume of Low-Level Waste Disposed On-site or Commercially (m^3)	52,468	29,762	-22,706	-43%
Nuclear Material Stabilized at Richland - Pu (kg)	946	N/A	N/A	N/A
Nuclear Material Stabilized at RFETS - Pu Solution (liters)	7,735	3,035	-4,700	-61%
Special Nuclear Material Shipments at RFETS - (# of shipments)	60	38	-22	-37%
Nuclear Material Stabilized at RFETS (Pu Residue kg bulk)	19,550	5,004	-14,546	-74%
Spent Nuclear Fuel Stabilized (MTHM)	3.680	0.753	-2.927	-80%
Number of Technology Deployments	49	122	73	149%

[a] See the following pages for explanation of variances on this chart which exceed +/-15 percent.

FY 1998 EM Corporate Performance Measure Variance Explanations

Listed below are explanations for variances between the FY 1998 planned and actual results for EM's Corporate Performance Measures that meet or exceed a +/- 15 percent threshold. The FY 1998 "planned" data are consistent with performance measures data reported in the FY 1999 Congressional Budget Request.

Facilities

- **Number of Facilities Decommissioned**

  The +37 in the number of facilities decommissioned is primarily a result of the addition of facilities that were not accounted for in the original facility inventory at the beginning of FY 1998.

Waste Treatment, Storage, and Disposal

- **Volume of High-Level Waste Treated**

  The -1,783 m^3 high-level waste treatment variance is primarily the result of an overstatement of the original target at one operations/field office due to the multiple counting of high-level waste treatment volumes as they transfer between projects. The year-end actual high-level waste treatment volumes reflect the appropriate counting methodology.

- **Number of High-Level Waste Canisters Produced**

  A total of 43 additional high-level waste canisters were produced in FY 1998. Savannah River produced fifty more canisters than the 200 planned due to process improvements and operational efficiencies. West Valley produced 81 canisters of high-level waste. While West Valley's canister count goal of 88 was not reached, the canisters were filled to a higher level thus producing only 81 canisters. (The increase in fill percentage was a significant waste minimization achievement).

- **Volume of Transuranic Waste Treated**

  The -165 m^3 transuranic waste treatment variance is primarily the result of activities that were put on hold pending the opening of the Waste Isolation Pilot Plant.

- **Volume of Transuranic Waste Disposed**

  The -388 to -592 m^3 transuranic waste disposal variance is the result of delays in disposal activities pending resolution of legal challenges to the opening of the Waste Isolation Pilot Plant.

- **Volume of Mixed Low-Level Waste Treated**

  The 4,437 m^3 increase in mixed low-level waste treatment is primarily due to: (1) a change in Savannah River Operations Office's use of the Consolidated Incinerator Facility campaign during FY 1998 from low-level waste to mixed low-level waste; (2) the addition of mixed low-level waste

volumes from Paducah and Portsmouth that had not previously been counted (as a result of changes to the definition); and (3) the use of funds redirected from projects with cost underruns.

- **Volume of Mixed Low-Level Waste Stored**

  The 11,793 increase in mixed low-level waste inventory is primarily due to the addition of waste volumes from Paducah and Portsmouth that had not previously been counted in the original target (as a result of changes to the definition to include all EM waste except remediation waste).

- **Volume of Mixed Low-Level Waste Disposed**

  The 2,533 m^3 increase in mixed low-level waste disposed is primarily the result of : (1) accelerated shipments of pondcrete at Rocky Flats; (2) the addition of mixed low-level waste volumes from Paducah and Portsmouth that had not previously been counted (as a result of changes to the definition); and (3) the use of funds redirected from projects with cost underruns.

- **Volume of Low-Level Waste Treated**

  The -6,742 m^3 low-level waste treatment variance is primarily the result of delays in the start of the Waste Sort Facility at Savannah River and the fact that no low-level waste was burned in the Consolidated Incinerator Facility.

- **Volume of Low-Level Waste Stored**

  The 125,413 m^3 increase in the volume of low-level waste inventory is largely the result of the addition of low-level waste volumes from Paducah and Portsmouth that had not been previously counted (as a result of changes to the definition for low-level waste to include all EM waste except remediation waste). Also contributing to the increase were: lawsuits that temporarily restricted low-level waste disposal; delays in the Waste Management Programmatic Environmental Impact Statement Records of Decision; and the temporary suspension of low-level waste shipments from Fernald to Nevada.

- **Volume of Low-Level Waste Disposed**

  The -22,706 m^3 low-level waste disposal variance is primarily due to: (1) delays in the startup of Savannah River's Waste Sort Facility and the Super Compactor which limited the ability to treat and dispose of waste; (2) less low-level waste was generated than originally anticipated at Albuquerque; and (3) the temporary suspension of low-level waste shipments from Fernald to Nevada. In addition, the original target was overstated by approximately 10,000 cubic meters as a result of counting remediation waste in the volumes initially reported.

Nuclear Material and Spent Nuclear Fuel Stabilization

The nuclear material performance measure subcategories were revised during FY 1998 to resolve classified data reporting issues. These revised performance measures are included in the EM Corporate Performance Measures table.

- **Nuclear Material Stabilized at Richland -- Plutonium (Pu) (kg)**

  This measure was revised during FY 1998 to avoid classified data reporting issues at some of EM's other sites. The FY 1998 "actual" is therefore "N/A".

- **Nuclear Material Stabilized at Rocky Flats -- Pu Solution (liters)**

  The -4,700 liter Pu solution variance at Rocky Flats is primarily a result of the termination of draining operations in Building 771 earlier in the year due to unexpected safety issues. While the desired commitment for draining of the Pu liquid systems was not achieved, some additional work scope, involving the strip out of piping, was accelerated and accomplished in FY 1998. The safety problems in Building 771 have been resolved and draining is expected to be completed in December 2001 along with the acceleration of the pipe removal activities.

- **Special Nuclear Material Shipments at Rocky Flats -- (# of shipments).**

  Rocky Flats completed a total of 38 special nuclear material shipments, including 30 shipments of former war reserve pits to the Pantex Plant, 5 shipments of highly-enriched uranium to the Y-12 Plant, and 3 pit shipments to the Los Alamos National Laboratory. Due to delayed funding at both receiver sites and a technical issue associated with highly-enriched uranium shipping, Rocky Flats was not able to complete all 60 planned special nuclear material shipments. The shipping of former war reserve pits to Pantex has resumed and the remaining shipments will be completed in FY 1999 The shipping of highly-enriched uranium to Y-12 resumed in September 1998 However, the technical issue associated with the highly-enriched uranium shipping is not totally resolved Alternatives to resolve this technical issue are currently under development in conjunction with Defense Programs.

- **Nuclear Material Stabilized at Rocky Flats -- Pu Residue (kg bulk)**

  The -14,546 kg bulk plutonium residue variance is primarily due to safety issues and construction delays at Rocky Flats. Recovery plans have been implemented for the Solid Residue Project Six new processing lines have been operational within the last several months and the recovery plan is projected to recoup most of the FY 1998 shortfall in FY 1999.

- **Spent Nuclear Fuel Stabilized**

  The -2.927 metric tons of heavy metal of spent nuclear fuel stabilized variance is due to schedule delays at the Idaho National Engineering and Environmental Laboratory as a result of the: (1) bankruptcy of VECTRA, a sub-tier contractor under Newport News Shipbuilding, that caused a delay in the design and fabrication of the Heated Vacuum Drying System. The spent fuel drying campaign, which relies on this equipment, impacted 55% of the spent fuel scheduled to be stabilized in FY 1998. Nevertheless, the commitment to the State of Idaho to complete the spent nuclear fuel storage facility by December 1998, has been met as specified in the Idaho Settlement Agreement, and (2) safety analysis issues have been resolved, and fuel stabilization activities at the canning station and the repair of the equipment and cranes necessary to relocate vulnerable spent fuel into new generation dry storage wells have resumed.

Science and Technology

- **Technology Deployments**

  Significantly higher numbers of innovative technology deployments were achieved than originally planned due to implementation of the Congressionally-supported Technology Deployment Initiative, adoption of a deployment orientation as part of the Focus Area-centered program

approach for technology development, and improved coordination of Science and Technology activities with EM line program needs/opportunities as part of the EM Integration activity and the EM *Accelerating Cleanup: Paths to Closure* process. In addition, because "technology deployment" is a relatively new EM Corporate Performance Measure, the initial FY 1998 deployment targets were somewhat conservative.

Environmental Management
FY 2000 Budget Request
Funding Distribution by Project Baseline Summary

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
Albuquerque									
AL Ops	AL002	AL Miscellaneous Programs	33,396	10,978	16,245	7,100	4,600	See below [b]	TBD
AL Ops	---	AL Accounting Adjustments	---	13,321	---	---	---	---	---
AL Ops	AL003	South Valley Superfund Site	8,508	163	0	0	0	8,345	9/30/03
AL Ops	AL004	New Mexico Agreement in Principle	100,335	0	1,650	980	950	96,755	TBD
Lovelace	AL005	Lovelace Biomedical and Environmental Research Institute	34,064	919	789	478	481	31,397	9/01/70
KCP	AL007	Environmental Restoration	236,638	3,832	3,513	1,756	1,100	226,437	TBD
LANL	AL008	Nuclear Material Facility Stabilization R&D	145,174	13,888	14,100	12,920	12,900	91,366	TBD
LANL	AL009	LANL Environmental Restoration	1,074,562	48,778	60,830	42,387	68,100	854,467	9/01/08
LANL	AL012	LANL Waste Management - Newly Generated Waste	55,279 [c]	28,676	26,603	0	0	n/a	n/a
LANL	AL013	LANL Waste Management - Legacy Waste	736,783	24,295	27,333	17,126	21,000	647,029	TBD
Pantex	AL014	Pantex Plant Site Remediation Project	92,514	8,761	11,161	11,299	15,000	46,293	9/01/15
Pantex	AL015	Pantex Waste Operations	23,006 [c]	10,924	12,082	0	0	n/a	n/a
SNL	AL017	Sandia National Laboratories (SNL) Waste Management	35,011 [c]	15,103	19,908	0	0	n/a	n/a
SNL	AL018	Sandia ER Project	108,311	18,463	28,460	27,260	19,435	14,693	9/30/31
Pinellas	AL019	Pinellas Plant Close-out & Administration of Post-Employment Benefits	404,766	52,861	-451	501	3,000	348,855	9/01/97

[a] Costs reflected here are in 'then year' dollars (also referred to as 'current year' dollars) in order to be comparable to budget authority. The costs reflected in the *Accelerating Cleanup: Paths to Closure* document are reflected in 'constant 1998' dollars.

[b] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance

[c] This cost estimate has been adjusted to reflect the transfer of responsibility for newly-generated waste to the generator program in FY 1999.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
UMTRA	AL020	UMTRA - Surface Remedial Action Project	133,459	41,074	35,936	20,782	0	35,667	9/30/99
GJPO	AL021	Maxey Flats Field Management Project	12,846	8,000	8,000	1,200	1,200	See below [a]	9/01/02
GJPO	AL022	Monticello Projects	132,873	16,204	25,558	34,250	22,000	34,861	9/01/01
UMTRA	AL023	UMTRA Ground Water	189,369	7,132	5,559	5,902	13,000	157,776	9/01/11
GJPO	AL024	GJO All Other Projects	4,006,263	16,831	14,015	7,163	8,500	3,959,754	9/30/70
Pinellas	AL025	Groundwater clean-up (PinellasPlant)	41,217	9,193	2,769	2,296	2,500	24,459	9/30/14
KCP	n/a	KCP activities [b]	----	7,882	0	0	0	n/a	n/a
LANL	AL-RSRP/LANL	Radioactive Source Recovery Program	98,794	0	975	1,611	6,000	90,208	9/1/10
LANL	AL026	Plutonium/Beryllium Sources [c]	TBD	0	0	1,738	1,834	TBD	TBD
LANL	AL027	Nuclear Criticality [d]	n/a	0	225	0	0	n/a	n/a
LANL	AL028	Nuclear Materials Stewardship Project Office	TBD	0	1,474	792	1,000	TBD	TBD
LANL	AL029	TA-21 Cleanup	TBD	0	0	5,000	0	TBD	TBD
Subtotal, Albuquerque				357,278	316,734	202,541	202,600		
Carlsbad									
WIPP	CAO-1	WIPP Base Operations	8,356,228	100,637	101,979	106,621	111,698	7,935,293	9/1/39
WIPP	CAO-2	WIPP Disposal Phase Certification and Experimental Program	1,869,855	46,113	39,862	37,387	35,295	1,711,198	9/1/39
WIPP	CAO-3	WIPP Transportation	1,574,057	14,196	9,186	17,494	19,222	1,513,959	9/1/33
WIPP	CAO-4	WIPP TRU Waste Sites Integration and Preparation	2,641,488	26,894	22,673	23,902	20,189	2,547,830	9/1/39
Subtotal, Carlsbad				187,840	173,700	185,404	186,404		
Chicago									
CH Ops	CH-COPS	CH Operations Program Support (Non-Def)	4,221	675	41	597	0	2,908	9/1/06

[a] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

[b] This scope was transferred to Defense Programs prior to Project Baseline Summary development and is therefore not included in the Project Baseline Summaries.

[c] This scope was transferred from Defense Programs to EM in FY 1999; baseline information will be developed in the next update of the *Accelerating Cleanup: Paths to Closure* document.

[d] This activity is now managed from the Headquarters project number HQNP-NCST, Nuclear Criticality Safety Training.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
CH Ops	CH-COPS-D	CH Operations Program Support (Defense)	20	0	20	0	0	n/a	n/a
Ames	CH-AMESRA	Ames Remedial Actions	233	130	103	0	0	0	9/1/97
Ames	CH-AMESWO	AMES Waste Operations	785	207	260	306	260	See below [a]	9/1/99
ANL-E	CH-ANLEDD	ANL-E Decontamination & Decommissioning Actions	27,664	4,093	570	5,732	6,898	10,371	9/30/02
ANL-E	CH-ANLEDD-D	ANL-E Decontamination & Decommissioning Actions (Defense)	4,075	0	4,075	0	0	0	9/30/02
ANL-E	CH-ANLEPM	ANL-E Program Management (Non-Def)	4,067	2,073	657	572	763	See below [a]	9/30/02
ANL-E	CH-ANLEPM-D	ANL-E Program Management (Defense)	78	0	78	0	0	0	9/30/02
ANL-E	CH-ANLERA	ANL-E Remedial Actions (Non-Def)	21,498	4,000	3,290	3,644	4,500	6,064	9/1/02
ANL-E	CH-ANLERA-D	ANL-E Remedial Actions (Defense)	932	932	0	0	0	0	9/1/02
ANL-E	CH-ANLEWO	ANL-E Waste Operations	25,400	13,489	7,251	8,222	7,600	See below [a]	10/1/99
ANL-W	CH-ANLWRA	ANL-W Remedial Actions	6,893	1,825	2,030	1,142	809	See below [b]	12/1/99
ANL-W	CH-ANLWWO	ANL-W Waste Operations	6,700 [c]	4,840	1,600	0	0	0	9/1/97
BNL	CH-BRNLBYW	BNL Boneyard Waste	8,445	0	1,801	1,151	2,787	2,706	8/1/00
BNL	CH-BRNLDD	BRNL Decontamination and Decommissioning Actions	35,524	0	143	3,023	130	32,228	12/3/04
BNL	CH-BRNLPM	BNL Program Management	24,737	3,162	3,393	3,503	3,647	11,032	11/1/06
BNL	CH-BRNLRA	BNL Remedial Actions	141,147	17,396	15,263	14,906	14,901	78,681	9/1/06
BNL	CH-BRNLWO	BNL Waste Operations	17,250	5,850	5,537	7,418	8,088	See below [a]	9/30/99
BNL	--	Accounting Adjustment	—	2,000	—	—	—	—	—
CH Ops	CH-CHOOPUAB	Princeton Site A/B Payments	2,484	0	153	504	644	1,183	TBD
CH Ops	CH-CHOOSA	Site A Cleanup	341	341	0	0	0	0	3/1/97
CH Ops	CH-CHOOSM-D	Surveillance and Maintenance Activities (Def)	483 [d]	244	221	0	0	0	9/1/98

[a] EM is refining the life-cycle cost estimate (as well as schedule baseline) for this project based on change in assumptions for transfer of newly-generated waste to the generator program.

[b] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

[c] This includes $260K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[d] Includes $18K of carryover from prior year appropriations that will be costed and is therefore in the EM baseline cost but is not reflected in the budget authority amounts shown here.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
Fermi	CH- FNALWO	FNAL Waste Operations	2,100	2,100	0	0	0	0	10/1/97
PPPL	CH-PPPLRA	PPPL Remedial Actions	1,527	500	424	351	273	See below [a]	TBD
PPPL	CH-PPPLWO	PPPL Waste Operations	9,003	3,199	2,866	2,992	2,800	See below [b]	9/1/99
Subtotal, Chicago				67,056	49,776	54,063	54,100		
Idaho									
INEEL	ID-ER-101	Test Area North Remediation	110,720	5,308	9,200	4,107	10,458	81,647	9/30/26
INEEL	ID-ER-102	Test Reactor Area Remediation	41,940	1,168	1,647	2,893	1,660	34,572	9/30/38
INEEL	ID-ER-103	Idaho Chemical Processing Plant Remediation	768,524	2,268	2,995	11,404	13,815	738,042	10/1/46
INEEL	ID-ER-104	Central Facilities Area (CFA) Remediation	29,551	4,483	1,768	871	2,038	20,391	9/30/02
INEEL	ID-ER-105	Power Burst Facility/Aux Reactor Area	17,968	1,142	1,241	871	2,213	12,501	10/2/02
INEEL	ID-ER-106 [c]	Radioactive Waste Management Complex Remediation	1,896,330	4,221	39,053	23,700	7,013	1,822,343	9/1/24
INEEL	ID-ER-107	Pit 9 Remediation	135,432	51,827	0	2,941	2,379	78,285	9/30/01
INEEL	ID-ER-108	Sitewide Monitoring Area Remediation	77,785	5,522	3,386	3,529	6,144	59,204	9/30/08
INEEL	ID-ER-109	Remediation Operations	610,429	28,349	14,955	19,872	14,984	532,269	9/1/70
INEEL	ID-ER-110	Decontamination & Decommissioning	857,257	3,273	7,374	5,339	7,866	833,405	9/30/44
INEEL	ID-HLW-101	High-Level Waste Pretreatment	1,057,754	35,248	40,038	38,546	38,751	905,171	9/1/14
INEEL	ID-HLW-103	High-Level Waste Treatment and Storage	4,626,205	8,197	18,312	13,053	24,674	4,561,969	12/1/37
INEEL	ID-HLW-104	Vitrified HLW Storage	96,868	0	0	0	0	96,868	9/1/70
INEEL	ID-HLW-105	Low Activity Waste Treatment	242,293	0	0	2,108	5,712	234,473	TBD
INEEL	ID-LRP-101	Environmental Engineering & Science Center	TBD	0	8,000	61	0	TBD	TBD
INEEL	ID-LRP-101-PC	Environmental Engineering & Science Center (Site/Project Completion)	TBD	0	0	8,939	0	TBD	TBD
INEEL	ID-OIM-101	Site-Wide Landlord Operations	4,000,260	26,661	23,076	29,604	34,626	3,886,293	9/1/2095
INEEL	ID-OIM-102	ICPP Non-Process Plant Operations	3,976,294	53,418	51,240	60,165	51,283	3,760,188	9/1/70
INEEL	ID-OIM-103	INEEL Medical Facilities	263	263	0	0	0	0	35,673

[a] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

[b] EM is refining the life-cycle cost estimate (as well as schedule baseline) for this project based on change in assumptions for transfer of newly-generated waste to the generator program.

[c] The Idaho Program for FY 2000 also includes the use of $43 million in prior year balances for Pit 9 activities, for a total project scope level of $50,013,000.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
INEEL	ID-OIM-104	INEEL Emergency Response Facilities	748 [a]	747	0	0	0	0	2/1/99
INEEL	ID-OIM-105	Security Facilities Consolidation Project	6,818 [b]	4,959	864	840	0	0	5/1/99
INEEL	ID-OIM-106	Electrical & Utility Systems Upgrade (EUSU) Project, ICPP	57,828	11,726	17,541	13,584	12,879	2,098	12/1/02
INEEL	ID-OIM-107	INEEL Electrical Distribution Upgrade	9,967	6,862	3,105	0	0	0	9/1/99
INEEL	ID-OIM-108	INEEL Road Rehabilitation	11,400	0	600	8,079	2,716	5	6/1/01
INEEL	ID-OIM-109	Health Physics Instrument Laboratory	12,440	0	0	1,049	7,310	4,081	12/30/02
INEEL	ID-OIM-110	Pre-FY 2007 Surplus Facility Deactivation Project	118,430	10,304	7,250	6,503	7,288	87,085	9/30/06
INEEL	ID-OIM-110-N	Pre-FY 2007 Surplus Facility Deactivation Project (Non-Defense)	TBD	1,508	627	4,638	763	TBD	9/30/06
INEEL	ID-OIM-111	Post-FY 2006 Surplus Facilities Deactivation Projects	55,290	0	0	0	0	55,290	9/1/50
INEEL	ID-OIM-112	Pre-2007 INEEL Surveillance and Maintenance (S&M)	38,055	3,350	3,853	4,330	4,189	22,333	9/1/55
INEEL	ID-OIM-112-N	Pre-2007 INEEL Surveillance and Maintenance (S&M) (Non-Def)	TBD	1,642	1,492	1,303	1,600	TBD	9/1/55
INEEL	ID-OIM-113	Post-2006 Surveillance, Maintenance, & Monitoring	116,813	0	0	0	0	116,813	9/1/55
INEEL	ID-OIM-114	Sitewide INEEL Information Network (SIINET)	TBD	0	0	0	50	TBD	TBD
INEEL	ID-OIM-115	Site Operations Center (SOC)	TBD	0	0	0	1,306	TBD	TBD
INEEL	ID-OIM-116	Environmental Legacy Compliance (VOC)	TBD	0	0	0	9,077	TBD	TBD
INEEL	ID-SNF-101	National Spent Nuclear Fuel Program	268,683	19,844	21,952	26,092	14,275	186,520	9/15/15
INEEL	ID-SNF-102	Integrated SNF Program	493,507	20,388	20,683	9,159	7,689	435,588	12/1/34
INEEL	ID-SNF-103	Emptied SNF Facilities	993,225	18,753	29,524	37,920	30,601	876,427	TBD
INEEL	ID-SNF-104	Constructed New Facilities	25,352	10,183	0	0	0	15,169	9/1/01
INEEL	ID-SNF-104-N	Constructed New Facilities (Non-Def)	4,648	0	751	0	3,500	397	9/1/01
INEEL	ID-WM-101	INEEL LLW/MLLW/Other Waste Program	209,606	30,073	21,855	25,632	22,191	109,855	9/1/06
INEEL	ID-WM-102	National LLW Program	38,848	4,553	4,021	4,086	3,345	22,843	9/30/06

[a] This includes $1K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[b] This includes $12K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) * 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
INEEL	ID-WM-103	INEEL Transuranic Waste	301,255	24,300	36,398	33,764	36,323	170,470	9/30/06
INEEL	ID-WM-105	AMWTP Production Operations	439,514	2,800	3,212	8,610	527	424,365	12/1/18
INEEL	ID-WM-106	INEEL Site-Wide Environmental Protection	816,869	8,074	5,176	6,988	7,508	789,123	9/30/50
INEEL	ID-WM-107	Long-Term Treatment/Storage/Disposal Operations	2,114,150	0	0	0	0	2,114,150	9/30/50
INEEL	ID-WM-108	Integrated Waste Operations Program	122,237	8,598	13,259	14,159	12,161	74,060	9/30/06
INEEL	ID-WV-103	Spent Nuclear Fuel (West Valley)	n/a	0	610	0	0	n/a	n/a
INEEL	ID-CTREXC-101	LLW/MLLW Center of Excellence	18,655	0	498	395	0	17,762	TBD
INEEL	HQNP-SI01-LT-ID	Security Investigations	TBD	0	0	508	508	TBD	TBD
Subtotal, Idaho				420,012	415,556	435,642	409,422 *		
Nevada									
NTS	NV202	Agreements in Principle/Grants	34,761	1,405	3,736	3,473	4,068	22,079	TBD
NTS	NV211	Soils	239,140	14,280	1,460	6,056	5,696	211,648	9/01/06
NTS	NV212	Underground Test Area (UGTA)	1,184,423	16,025	20,277	29,009	33,236	1,085,876	9/13/14
NTS	NV214	Industrial Sites	469,942	7,506	13,000	10,800	11,405	427,231	10/1/08
NV Ops	NV240	Off-sites	177,796	9,325	3,933	7,036	8,634	148,868	7/1/06
NTS	NV350	TRU/Mixed TRU	34,650	1,027	5,628	5,141	6,483	16,371	9/1/03
NTS	NV360	Mixed Low-Level Waste	6,512	0	677	744	388	4,703	9/1/07
NTS	NV370	Low-Level Waste	2,376,995	13,423	5,542	5,420	5,864	2,346,746	9/1/70
NTS	NV400	Program Integration	1,068,278	10,053	14,665	12,402	9,533	1,021,625	9/1/70
Subtotal, Nevada				73,044	68,918	80,081	85,307		
Oakland									
LLNL	OAK-001	LLNL Main Site Remediation	203,976	10,988	12,299	11,475	10,500	158,714	9/30/06
ETEC	OAK-007	ETEC Remediation	139,461	16,376	9,743	8,352	10,248	94,742	9/30/06
ETEC	OAK-009	ETEC Landlord	84,800	0	4,000	5,578	3,650	71,572	9/30/02
LLNL	OAK-041	Accelerated Waste Treatment	12,330	2,000	1,253	1,315	2,000	5,762	9/1/02
LLNL	OK-002	LLNL Site 300 Remedial Action	155,759	12,692	9,255	9,843	11,800	112,169	9/30/06
LBNL	OK-003	LBNL Soils and Groundwater (Envir Restor)	77,272	3,154	2,833	3,500	3,500	64,285	9/30/03

* The Idaho Program for FY 2000 also includes the use of $43 million in prior year balances for Pit 9 activities, for a total program level of $452.422 million.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
LBNL	OK-004	LBNL Haz. Waste Handling Facil Closure (Envir Restor)	1,131 [a]	0	657	0	0	0	9/30/98
SLAC	OK-005	Stanford Linear Accelerator Center (Environ. Restor.)	5,183	995	1,006	1,000	1,400	782	9/7/00
LEHR	OK-010	LEHR Environmental Restoration	18,201	3,535	5,580	3,030	3,000	3,056	9/1/02
GTF	OK-011	*Soil Remediation* (GTF)	1,300 [b]	1,000	0	0	0	0	35,399
GA	OK-012	Hot Cell Facility D&D at General Atomics	11,380	3,600	4,280	2,030	1,100	370	8/1/00
GE	OK-013	General Electric D&D (Environ. Restoration)	22,629	0	0	313	500	21,816	9/1/05
LEHR	OK-014	LEHR Waste Management	4,391	472	1,222	1,359	863	475	9/1/01
LBNL	OK-015	LBNL *Legacy* Waste	8,708	399	0	1,228	1,498	5,583	9/30/03
LBNL	OK-016	LBNL Newly Generated Wastes	17,048	5,195	5,775	5,940	6,100	See below [c]	n/a
LLNL	OK-021	LLNL Base Program	64,513	22,015	19,778	21,434	21,891	See below [d]	TBD
LLNL	OK-026	LLNL General Plant Projects	1,240	500	375	395	1,700	See below [d]	TBD
LLNL	OK-027	LLNL *Decontam. & Water Treatment Facil*	29,328	9,500	11,250	4,752	2,000	1,826	7/1/02
OK Ops	OK-040	Program Management and State Grants	TBD	100	87	0	300	TBD	10/1/36
OK Ops	OK-040-D	Program Management and State Grants (Defense)	TBD	5,370	2,192	2,700	800	TBD	10/1/36
OK Ops	—	OAK Accounting Adjustment	—	2,279	—	—	—	—	—
ETEC	OK-042	ETEC Waste Management	42,752	2,208	3,882	2,564	3,500	30,598	9/6/06
SPRU	SP-SPRU	Separations Process Research Unit (SPRU)	242,737	0	0	0	500	242,237	9/1/14
Subtotal, Oakland				102,378	95,467	86,808	86,850		
Oak Ridge									
FUSRAP	FUSRAP	Formerly Utilized Sites Remedial Action Proj	n/a	73,970	0	0	0	n/a	n/a

[a] This includes $474K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[b] This includes $300K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[c] EM is refining the life-cycle cost estimate (as well as schedule baseline) for this project based on change in assumptions for transfer of newly-generated waste to the generator program.

[d] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) * 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
ORR	OR-38109	Hazardous Waste Management	980,983	4,270	5,337	4,602	5,506	961,268	10/1/2096
ORR	OR-38110	Sanitary/Industrial Waste Management	1,401,571	6,976	5,681	4,799	7,026	1,377,089	10/1/2096
ORR	OR-38111	Mixed Low Level Waste Management	7,899,750	87,530	100,375	66,311	73,706	7,571,828	9/30/06
ORR	OR-38112	Low Level Waste Management	6,470,958	50,784	32,643	26,741	31,821	6,328,969	9/30/13
ORR	OR-38212	Low Level Waste Management (Non-Defense)	17,230	9,997	7,233	0	0	0	9/30/13
ORR	OR-38113	Transuranic Waste Management	336,273	15,294	12,746	17,824	13,766	276,643	9/30/06
ORR	OR-42101	Y-12 East Fork Poplar Creek Remedial Action	966,381	18,367	18,635	4,757	6,886	917,736	9/1/10
ORR	OR-42102	Y-12 Bear Creek Remedial Action	110,758	1,007	3,975	7,988	8,210	89,578	9/1/10
ORNL	OR-43101	ORNL Melton Valley Watershed D&D (Defense)	523,541	0	6,623	0	24,307	492,611	9/30/12
ORNL	OR-43201	ORNL Melton Valley Watershed D&D (Non-Defense)	53,751	5,221	15,096	33,434	0	0	9/30/12
ORNL	OR-43102	ORNL Melton Valley Watershed Remedial Action (Defense)	151,080	0	464	0	1,300	149,316	9/30/13
ORNL	OR-43202	ORNL Melton Valley Watershed Remedial Action (Non-Defense)	23,409	17,909	2,927	2,573	0	0	9/30/13
ORNL	OR-43103	ORNL Bethel Valley Remedial Action (Defense)	1,598,657	7,799	833	0	28,569	1,561,456	9/30/11
ORNL	OR-43203	ORNL Bethel Valley Remedial Action (Non-Def)	50,198	12,531	19,194	18,473	0	0	9/30/11
ORNL	OR-43104	ORNL Bethel Valley D&D (Defense)	209,580	0	0	0	3,629	205,951	9/30/10
ORNL	OR-43204	ORNL Bethel Valley D&D (Non-Def)	12,560	3,061	4,302	5,197	0	0	9/30/10
ORR	OR-44105	ETTP Landlord (Defense)	51,872	0	6,432	24,721	24,681	See below *	9/30/06
ORR	OR-44305	ETTP Landlord (D&D Fund)	TBD	21,896	5,226	29,627	16,455	TBD	9/30/06
ORR	OR-44301	ETTP Remedial Action	1,270,942	13,150	27,181	114	13,491	1,217,006	9/1/11
ORR	OR-44302	ETTP Process Equipment D&D	587,517	6,346	18,474	47,500	62,500	452,697	9/1/07
ORR	OR-44103	ETTP D&D (Defense)	342,765	910	1,513	2,686	7,380	330,276	9/1/09
ORR	OR-44303	ETTP D&D (Fund)	TBD	33,652	33,908	27,786	29,622	TBD	9/1/09
ORR	OR-44304	ETTP Facility Safety Upgrades	40,000	0	0	0	0	40,000	9/30/00
Paducah	OR-45301	Paducah Remedial Action	1,586,491	20,675	20,020	20,788	20,647	1,504,361	9/30/10
Paducah	OR-45302	Paducah Waste Management	276,097	16,783	19,562	15,195	16,853	207,704	9/30/06
Portsmouth	OR-46301	Portsmouth Remedial Action	1,493,977	22,477	18,978	12,370	20,023	1,420,129	9/1/01

* EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting appropriated balance.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
Portsmouth	OR-46302	Portsmouth Waste Management	305,256	23,379	24,075	22,749	17,477	217,576	9/1/05
WSSRAP	OR-47201	Weldon Spring Disposal Facility	275,701	37,734	49,786	51,200	51,500 [a]	85,481	8/31/02
WSSRAP	OR-47202	Weldon Spring Waste Treatment	71,380	25,955	16,900	12,300	500 [a]	15,725	9/30/01
WSSRAP	OR-47203	Weldon Spring Long-Term S&M	45,900	0	0	0	0	45,900	9/30/33
ORR	OR-48103	Offsite Remedial Action (Defense)	1,299,569	26,564	26,468	9,168	15,409	1,221,960	8/31/06
ORR	OR-48203	Offsite Remedial Action (Non-Def)	TBD	328	6,993	3,427	400	TBD	8/31/06
ORR	OR-48303	Offsite Remedial Action (D&D Fund)	TBD	0	19,670	9,921	8,030	TBD	8/31/06
OR Ops	OR-48104	Directed Support (Defense)	67,694	7,650	398	2,898	4,162	52,586	9/1/06
OR Ops	OR-48204	Directed Support (Non-Def)	TBD	6,583	1,523	1,100	1,105	TBD	9/1/06
OR Ops	OR-48304	Directed Support (D&D Fund)	TBD	28,535	3,106	4,150	5,100	TBD	9/1/06
ORR	OR-63101	Nuclear Material & Facility Stabilization (Defense)	55,915	2,379	2,702	3,600	7,640	39,594	9/1/03
ORR	OR-63201	Nuclear Material & Facility Stabilization (Non-Def)	TBD	12,242	8,279	6,901	2,297	TBD	9/1/03
OR Ops	HQNP-SI01-LT-OR	Security Investigations	TBD	0	0	661	563	TBD	TBD
Subtotal, Oak Ridge				621,954	547,258	501,561	530,561		
Ohio									
Ashtabula	OH-AB-01	Remediation	68,254	10,152	9,757	10,393	10,643	27,309	9/1/18
Ashtabula	OH-AB-02	Project Management, Site Services, ES&H	29,187	5,923	4,880	5,012	4,762	8,610	9/30/02
Columbus	OH-CL-01	King Avenue Site Decontamination	18,134	12,035	5,615	1,219	1,500	See below [b]	9/1/98 [b]
Columbus	OH-CL-02	West Jefferson Site Decontamination (Non-Def)	53,487	0	457	5,750	5,134	42,146	9/1/05
Columbus	OH-CL-02-D	West Jefferson Site Decontamination (Defense)	TBD	0	2,773	2,000	6,000	TBD	9/1/05
Columbus	OH-CL-03	Project Management, Site Support & Maintenance (Non-Def)	29,576	1,000	1,677	1,563	659	24,677	9/1/05
Columbus	OH-CL-03-D	Project Management, Site Support & Maintenance (Defense)	TBD	1,765	2,045	1,593	2,841	TBD	9/1/05
Fernald	OH-FN-01	Facility Shutdown	297,133	43,348	44,744	29,211	25,125	154,705	9/30/98

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63.5 million. The program will work to identify funding sources for this important activity.

[b] EM is refining the life-cycle cost estimate (and planned completion date) for this project.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
Fernald	OH-FN-02	Facility D&D	194,843	9,192	9,206	13,794	17,689	144,962	5/30/05
Fernald	OH-FN-03	On-Site Disposal Facility	209,820	20,763	15,113	16,264	19,438	138,242	9/1/06
Fernald	OH-FN-04	Aquifer Restoration	269,642	30,683	22,811	24,974	24,296	166,878	9/1/08
Fernald	OH-FN-05	Waste Pits Remediation Project	405,267	13,308	44,056	46,147	48,840	252,916	5/1/05
Fernald	OH-FN-06	Soils	203,481	12,766	12,760	19,532	15,654	142,769	4/1/06
Fernald	OH-FN-07	Silos	466,911	17,761	22,654	17,545	33,922	375,029	9/30/08
Fernald	OH-FN-08	Nuclear Materials	5,935	0	3,800	3,167	2,121	See below [b]	9/1/99
Fernald	OH-FN-09	Thorium Overpack	1,650 [a]	1,582	0	0	0	0	7/1/97
Fernald	OH-FN-10	Mixed Waste	21,961	6,469	9,020	5,279	5,786	See below [b]	9/1/99
Fernald	OH-FN-11	Waste Management	96,136	21,717	15,333	19,489	14,910	24,687	9/1/00
Fernald	OH-FN-12	Program Support & Oversight	800,098	81,086	59,203	78,600	72,808	508,401	9/30/08
Miamisburg	OH-MB-01	Tritium Operations Transition	19,753	16,495	16,040	0	0	See below [c]	9/30/98
Miamisburg	OH-MB-02	Main Hill Tritium	57,769	0	12,157	33,413	35,266	See below [c]	4/1/01
Miamisburg	OH-MB-02-N	Main Hill Tritium (Non-Def)	TBD	97	992	1,003	1,000	TBD	4/1/01
Miamisburg	OH-MB-03	Legacy Waste	17,110	6,418	7,345	14,434	7,199	See below [c]	9/1/01
Miamisburg	OH-MB-04	Main Hill Rad	21,722	1,891	3,156	3,357	4,006	See below [c]	10/1/01
Miamisburg	OH-MB-05	Main Hill Non-Rad	9,509	373	4,105	2,776	2,768	See below [c]	11/1/02
Miamisburg	OH-MB-06	SM/PP Hill	22,981	3,997	5,026	2,526	6,617	See below [c]	9/1/02
Miamisburg	OH-MB-07	Test Fire Valley	29,794	1,400	4,329	4,513	7,157	See below [c]	12/2/02
Miamisburg	OH-MB-08	Soils	47,126	14,414	13,046	6,928	3,097	See below [c]	9/29/02
Miamisburg	OH-MB-09	Facility Operations and Maintenance	67,890	8,768	19,057	19,191	19,038	See below [c]	1/1/03
Miamisburg	OH-MB-10	Regulatory Oversight & Site Support	573,700	35,059	1,369	808	7,205	See below [c]	9/1/05
WVDP	OH-WV-01	HLW Vitrification and Tank Heel High Activity Waste Processing	306,000	54,000	53,000	43,800	43,100	112,100	9/30/02
WVDP	OH-WV-02	Site Transition, Decommissioning, & Project Completion	544,002	20,482	17,185	30,753	29,553	446,029	9/30/05
WVDP	OH-WV-03	Spent Nuclear Fuel	22,059	768	1,561	2,800	4,900	12,030	9/30/05

[a] This includes $68K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[b] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

[c] EM is revising the life-cycle cost estimate for this project based upon changes in assumptions for funding the Regulatory Oversight and Site Support project (OH-MB-10).

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
WVDP	OH-WV-04	Project Management/Site Support	338,000	43,111	42,000	30,000	29,800	193,089	9/30/05
OH Ops	HQNP-SI01-CL-OH	Security Investigations (Ohio)	TBD	0	0	94	94	TBD	TBD
Subtotal, Ohio				496,823	486,272	497,928	512,928		
Richland									
Hanford	RL-ER01	100 Area Remedial Action	638,592	16,095	12,074	22,054	26,111	562,258	9/30/11
Hanford	RL-ER02	200 Area Remedial Action	2,860,382	1,671	1,279	1,967	0	2,855,465	9/30/26
Hanford	RL-ER03	300 Area Remedial Action	209,665	6,519	6,819	7,809	6,296	182,222	9/30/13
Hanford	RL-ER04	Environmental Restoration Disposal Facility	735,504	14,841	21,383	29,952	16,030	653,298	9/30/44
Hanford	RL-ER05	Facility Surveillance & Maintenance	684,788	9,775	10,742	13,844	12,278	638,149	9/30/43
Hanford	RL-ER06	Decontamination and Decommissioning	3,710,138	12,475	17,675	11,540	10,769	3,657,679	9/30/30
Hanford	RL-ER07	Post Closure Surveillance & Maintenance	133,698	198	-10	59	60	133,391	9/30/43
Hanford	RL-ER08	Groundwater Management	832,937	14,770	20,603	19,152	19,394	759,018	10/30/43
Hanford	RL-ER09	N Reactor Deactivation	27,657 [a]	13,515	15,772	0	0	0	4/1/98
Hanford	RL-ER10	Program Management and Support	2,728,183	44,290	31,302	32,923	32,837	2,586,831	9/30/44
Hanford	RL-HM01	HAMMER	439,070	13,150	4,883	5,800	5,900	409,337	9/30/46
Hanford	RL-OT01	MISSION SUPPORT	2,943,945	28,270	22,857	26,180	25,866	2,840,772	9/30/46
RL Ops	RL-OT04	RL Directed Support	1,244,374	23,562	25,595	24,641	16,400	1,154,176	9/30/46
RL Ops	RL-RG01	TWRS Regulatory Unit	37,725	0	4,090	5,039	5,663	22,933	9/30/06
RL Ops	RL-ST01	PNNL WASTE MANAGEMENT	1,582,979	12,012	14,851	15,020	13,961	1,527,135	9/30/46
Hanford	RL-TP01	B-Plant Sub-Project	51,108	24,107	20,460	2,716	0	3,825	9/30/99
Hanford	RL-TP02	WESF Sub-Project	271,402	12,610	13,263	10,900	14,700	219,929	9/30/19
Hanford	RL-TP03	PUREX Sub-Project	21,999 [b]	16,088	-67	0	0	0	7/31/98
Hanford	RL-TP04	300 Area/SNM Sub-Project	20,647	1,591	3,677	4,444	3,658	7,277	9/29/00
Hanford	RL-TP05	PFP Deactivation	TBD	69,330	57,724	104,136	136,197	TBD	5/6/14
Hanford	RL-TP08	324/327 Facility Transition Project	181,261	6,720	21,068	31,547	27,908	94,018	3/9/05
Hanford	RL-TP08-N	324/327 Facility Transition Project (Non-Def)	21,912	8,712	13,200	0	0	0	3/9/05
Hanford	RL-TP09	K Basin Deactivation	133,513	0	0	0	0	133,513	10/2/07

[a] This includes $7,242K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

[b] This includes $5,354K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) * 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
Hanford	RL-TP10	Accelerated Deactivation	572,057	0	2,114	1,738	1,741	566,464	9/30/37
Hanford	RL-TP11	Advanced Reactors Transition	69,037	10,940	5,853	1,863	1,418	48,963	3/31/02
Hanford	RL-TP12	Transition Project Management	313,468	8,669	10,776	15,148	15,191	263,684	9/30/37
Hanford	RL-TP13	Landlord Project	687,132	12,294	13,123	12,599	14,000	635,116	9/30/46
Hanford	RL-TP14	Hanford Surplus Facility Prog 300 Area Revitalization Project	126,648	0	735	508	646	124,759	12/31/07
Hanford	RL-TW01	Tank Waste Characterization	216,865	57,525	40,987	36,800	26,097	55,456	9/30/01
Hanford	RL-TW02	Tank Safety Issue Resolution Project	129,542	34,070	28,636	19,900	26,691	20,245	9/30/05
Hanford	RL-TW03	Tank Farms Operations	936,753	146,581	112,527	120,823	151,972	404,850	9/30/07
Hanford	RL-TW04	Retrieval Project	5,858,843	21,743	56,917	64,414	55,113	5,660,656	9/30/46
Hanford	RL-TW05	Process Waste Support	1,263,443	5,272	18,158	2,168	10,241	1,227,604	9/30/28
Hanford	RL-TW08	Process Waste Privatization Infrastructure	2,947,837	2,145	0	18,400	18,914	2,908,378	9/30/36
Hanford	RL-TW09	Immobilized Tank Waste Storage & Disposal Project	17,897,748	1,902	10,776	9,200	7,652	17,868,218	9/30/46
Hanford	RL-TW10	TWRS Management Support	265,501	27,542	38,087	34,217	38,320	127,335	9/30/05
Hanford	RL-WM01	Spent Nuclear Fuels Project	872,751	170,035	152,887	170,400	190,955	188,474	9/30/03
Hanford	RL-WM02	Canister Storage Building Operations	885,608	0	0	0	0	885,608	9/30/46
Hanford	RL-WM03	Solid Waste Storage and Disposal	1,781,594	26,631	31,551	34,851	36,919	1,651,642	9/30/46
Hanford	RL-WM04	Solid Waste Treatment	2,256,844	40,991	30,134	22,089	25,359	2,138,271	9/30/35
Hanford	RL-WM05	Liquid Effluents Project	1,397,075	35,689	30,378	29,359	30,988	1,270,661	9/30/32
Hanford	RL-WM06	Analytical Services	1,960,142	29,722	28,518	26,801	26,734	1,848,367	9/30/46
Hanford	RL-VZ01	Site-Wide Groundwater/Vadose Zone Integration Project	TBD	0	0	6,700	11,325	TBD	TBD
Hanford	HQNP-SI01-LT-RL	Security Investigations	TBD	0	0	791	807	TBD	TBD
Subtotal, Richland				982,052	951,397	998,492	1,065,111		
Rocky Flats									
RFETS	RF001	Buffer Zone Closure Project	247,135	17,003	13,606	13,646	10,185	192,695	9/30/10
RFETS	RF002	Waste Management Project	1,143,776	39,978	56,508	68,122	79,775	899,393	9/30/10
RFETS	RF003	Remediation Waste & Contingent Storage Project	10,437	0	-9	1	0	10,445	9/30/10
RFETS	RF004	SNM Capital Support Project	17,339	6,578	9,463	2,477	3,930	See below *	9/30/01

* EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $).[a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
RFETS	RF005	IAEA Project	1,262	175	0	0	0	1,087	9/30/04
RFETS	RF006	SNM Consolidation Project	54,151	6,150	3,008	2,234	1,287	41,472	11/1/13
RFETS	RF007	New Pu Interim Storage Vault	1,644	1,627	17	0	0	0	9/30/97
RFETS	RF008	Pu Metals and Oxides Stabilization	66,238	5,832	7,206	15,603	14,593	23,004	9/30/04
RFETS	RF009	Pu Solid Residue Stabilization Project	476,016	38,704	56,263	49,888	64,882	266,279	9/30/03
RFETS	RF010	Pu Liquid Stabilization	41,561	10,470	12,473	8,672	0	9,946	9/30/99
RFETS	RF011	Uranium Disposition Project	12,692	11,158	587	1,048	0	See below[a]	6/1/99
RFETS	RF012	SNM Shipping Project	27,769	1,470	3,475	7,166	17,166	See below[a]	9/30/04
RFETS	RF013	Closure Caps Project	81,993	0	0	30	0	81,963	9/30/10
RFETS	RF014	Industrial Zone Closure Project	330,224	24,968	22,269	23,127	19,799	240,061	9/1/09
RFETS	RF015	Miscellaneous Production Zone Cluster Closure Project	136,502	14,690	8,828	11,488	14,969	86,527	9/30/09
RFETS	RF016	Building 371 Cluster Closure Project	334,913	20,944	15,930	19,384	20,014	258,641	9/1/08
RFETS	RF017	Building 707/750 Cluster Closure Project	242,388	18,204	16,942	19,880	18,669	168,693	9/30/08
RFETS	RF018	Building 771/774 Cluster Closure Project	207,231	21,183	19,097	20,524	20,764	125,663	9/30/06
RFETS	RF019	Building 776/777 Cluster Closure Project	236,832	12,002	12,728	16,058	15,486	180,558	9/1/07
RFETS	RF020	Building 881 Cluster Closure Project	92,268	5,316	5,064	5,083	4,542	72,263	9/30/08
RFETS	RF021	Building 991 Cluster Closure Project	17,001	1,119	1,048	1,471	1,146	12,217	9/30/05
RFETS	RF022	Building 779 Cluster Closure Project	21,117	6,309	19,561	20,495	7,200	See below[a]	9/30/00
RFETS	RF023	Utilities and Infrastructure Project	703,734	48,131	41,906	40,574	41,905	531,218	9/30/10
RFETS	RF024	Safeguards and Security Project	412,003	8,864	36,792	45,002	43,531	277,814	9/1/10
RFETS	RF025	Infrastructure Improvement/Replacement Project	84,685	0	19,907	17,782	8,026	38,970	9/30/02
RFETS	RF027	Analytical Services Project	83,327	12,827	9,957	7,122	7,807	45,614	9/30/10
RFETS	RF029	Rocky Flats Field Office - DOE Mgmt	742,156	34,888	20,797	17,855	18,800	649,816	9/1/09
RFETS	RF030	K-H Project Management	1,359,719	118,795	122,949	127,068	120,731	870,176	9/30/10
RFETS	RF034	Management Project	TBD	0	95,728	94,452	100,725	TBD	TBD
RF Ops	HQNP-SI01-CL	Security Investigations (Closure)	TBD	0	0	948	1,278	TBD	TBD
Subtotal, Rocky Flats				487,385	632,100	657,200	657,210		

[a] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	Budget Authority: FY 1998 Current Approp	Budget Authority: FY 1999 Current Approp	Budget Authority: FY 2000 Request	Budget Authority: Unappropriated Balance	Planned Compl. Date
Savannah River									
SRS	SR-DO02	WSI Landlord Project	2,572,557	47,488	52,600	54,375	54,475	2,363,619	TBD
SR Ops	SR-DO03	Savannah River Natural Resource Management and Research Institute	269,695	9,211	7,800	6,379	7,038	239,267	TBD
SR Ops	SR-DO04	Ecology Lab Project	349,597	9,286	8,600	7,896	8,084	315,731	TBD
SR Ops	SR-DO05	DOE External Program Support	300,424	3,525	5,718	6,155	6,150	278,876	TBD
SR Ops	SR-DO07	DOE Program Support	319,009	7,841	5,999	10,923	7,208	287,038	9/1/28
SRS	SR-ER01	Flood Plain Swamp Project	145,863	22,795	5,543	8,482	6,112	102,931	4/9/09
SRS	SR-ER02	Four Mile Branch Project	382,494	17,245	28,372	25,140	35,379	276,358	6/12/15
SRS	SR-ER03	Lower Three Runs & Operations Project	956,217	5,195	4,385	20,137	26,603	899,897	6/12/15
SRS	SR-ER04	Pen Branch Project	100,765	3,067	10,043	6,866	8,984	71,805	12/22/11
SRS	SR-ER05	Steel Creek Project	114,311	840	2,431	7,451	3,316	100,273	12/8/10
SRS	SR-ER06	Upper Three Runs Project	570,477	23,139	22,091	20,115	15,879	489,253	9/11/17
SRS	SR-ER07	Program Management	296,940	30,420	23,845	11,500	13,470	217,705	9/30/38
SRS	SR-ER08	Facility Disposition Program Planning	93,928	0	0	0	0	93,928	9/1/28
SRS	SR-ER09	HWCTR Projects	9,140 [a]	4,206	4,248	0	0	0	9/1/98
SRS	SR-FA02	F Canyon Deactivation Project	101,300	0	0	522	537	100,241	9/30/15
SRS	SR-FA03	FB Line Deactivation Project	49,000	0	0	0	0	49,000	9/1/15
SRS	SR-FA04	H Canyon Deactivation Project	84,490	0	0	0	0	84,490	9/1/12
SRS	SR-FA05	HB Line Deactivation Project	33,930	0	0	0	0	33,930	9/1/12
SRS	SR-FA06	235-F Deactivation Project	92,556	0	0	0	0	92,556	9/1/13
SRS	SR-FA07	Old HB Line Deactivation Project	22,291	0	0	0	0	22,291	9/30/10
SRS	SR-FA08	P Reactor Deactivation Project	15,871	673	0	0	0	15,198	6/1/12
SRS	SR-FA09	C Reactor Deactivation Project	15,871	2,468	0	0	0	13,403	6/1/12
SRS	SR-FA10	R Reactor Deactivation Project	18,055	5,832	0	0	0	12,223	6/1/12
SRS	SR-FA11	K Reactor Deactivation Project	16,172	0	0	0	0	16,172	6/1/12
SRS	SR-FA12	L Reactor Deactivation Project	16,804	0	0	0	0	16,804	6/1/15
SRS	SR-FA13	RBOF Deactivation Project	12,156	0	0	0	0	12,156	9/1/15
SRS	SR-FA14	D Area Deactivation Project	7,952	0	0	0	0	7,952	9/1/11
SRS	SR-FA15	M Area Deactivation Project	13,895	5,720	0	0	0	8,175	9/1/11
SRS	SR-FA16	F-Area Monitoring	4,287,988	2,569	1,545	738	444	4,282,692	9/1/70

[a] This includes $686K of carryover from prior year appropriations that will be costed and is therefore included in the EM baseline cost but is not reflected in the budget authority amounts shown here.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unappropriated Balance	Planned Compl. Date
SRS	SR-FA17	H-Area Monitoring & Minor Facility Monitoring	2,589,106	0	0	2,764	4,713	2,581,629	9/1/70
SRS	SR-FA18	M Area Monitoring Project	448,928	6,400	23,692	11,103	8,087	399,646	9/1/70
SRS	SR-FA19	D Area Monitoring Project	68,794	0	0	0	1,261	67,533	9/1/70
SRS	SR-FA20	Reactors Monitoring Project	2,114,012	2,486	8,582	10,081	13,566	2,079,297	9/1/70
SRS	SR-FA22	RBOF Monitoring Project	253,773	0	0	0	0	253,773	9/1/70
SRS	SR-HL01	H-Tank Farm	2,561,414	92,021	85,756	91,516	87,851	2,204,270	9/1/24
SRS	SR-HL02	F-Tank Farm	1,585,667	47,234	51,347	57,479	60,737	1,368,870	9/1/21
SRS	SR-HL03	Waste Removal Ops & Tank Closure	1,337,632	26,865	1,603	3,099	1,943	1,304,122	9/1/26
SRS	SR-HL04	ITP/ESP/LW Operations	3,636,322	75,965	75,233	48,374	58,446	3,378,304	9/1/24
SRS	SR-HL05	Vitrification	5,672,104	133,158	126,864	131,959	126,614	5,153,509	9/1/24
SRS	SR-HL06	Glass Waste Storage	206,178	0	324	599	368	204,887	9/1/26
SRS	SR-HL07	Effluent Treatment Facility	822,282	22,941	17,900	16,539	17,580	747,322	10/1/25
SRS	SR-HL08	Saltstone	708,395	10,803	8,096	1,102	1,222	687,172	9/1/24
SRS	SR-HL09	Tank Farm Services Upgrades	13,424	5,017	3,660	1,099	0	3,648	9/30/99
SRS	SR-HL10	H-Tank Farm Storm Water System Upgrades	12,004	0	1,110	3,633	4,430	2,831	9/30/00
SRS	SR-HL11	Tank Farm Support Services F Area	33,306	0	0	3,243	4,314	25,749	12/1/01
SRS	SR-HL12	HLW Removal	1,177,273	2,131	23,923	22,874	14,433	1,113,912	9/1/23
SRS	SR-HL13	Salt Disposition	TBD	0	0	12,983	42,129	TBD	TBD
SRS	SR-IN01	Plantwide Fire Protection Line Item	29,466	0	1,257	1,490	637	26,082	9/1/00
SRS	SR-IN02	Operations Support Facility Line Item	11	0	4,760	0	0	See below [a]	TBD
SRS	SR-IN03	Plant Maintenance Line Item	1,821	154	0	0	0	1,667	9/30/97
SRS	SR-IN04	Domestic Water Line Item	7,811 [b]	1,847	540	0	0	0	3/1/98
SRS	SR-IN05	CFC HVAC Chiller Retrofit	45,397	10,271	10,287	9,702	2,043	13,094	9/1/01
SRS	SR-IN06	Radio Trunking System Line Item	8,243 [b]	350	230	0	0	0	7/1/98
SRS	SR-IN07	Site Road Infrastructure Line Item	246	4,224	2,776	0	0	See below [a]	9/30/98
SRS	SR-IN08	High Level Drain Lines Line Item	1,417 [b]	0	476	0	0	0	11/1/98
SRS	SR-IN09	Health Physics Support Line Item	4,916 [b]	2,957	0	0	0	0	9/1/98
SRS	SR-IN10	Regulatory Monitoring and Bioassay Lab	33,620	2,894	6,103	7,542	12,994	4,087	3/31/01
SRS	SR-IN11	Infrastructure Line Item	371,473	0	0	1,274	200	369,999	9/30/28
SRS	SR-IN12	Operating Projects	1,131,333	5,123	10,207	18,246	32,693	1,065,064	9/30/28

[a] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

[b] Includes costs incurred prior to FY 1997.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
SRS	SR-IN13	Decontamination of Lab Facilities, 772-F & 773-A	12,970	0	0	0	2,774	10,196	7/1/02
SRS	SR-NM01	F-Area Stabilization Project	1,267,153	171,688	173,799	181,939	206,565	533,162	9/30/03
SRS	SR-NM02	H-Area Stabilization Project	1,396,155	140,262	132,816	136,304	152,651	834,122	9/30/05
SRS	SR-NM03	Nuclear Material Storage Line Item	187,586	11,374	21,292	90,060	7,505	57,355	4/30/02
SRS	SR-NM04	Canyon Exhaust Line Item	9,828	495	1,826	5,819	0	See below [a]	10/1/99
SRS	SR-NM06	Nuclear Materials Storage	892,600	0	0	0	0	892,600	10/1/28
SRS	SR-SF01	K-Reactor Spent Nuclear Fuel Project	86,918	31,680	29,393	25,845	0	n/a	n/a
SRS	SR-SF01-LT	K-Reactor Spent Nuclear Fuel Project (Post 2006)	111,533	0	0	0	33,410	78,123	TBD [b]
SRS	SR-SF02	L-Reactor Spent Nuclear Fuel Project	512,568	21,521	20,108	31,826	36,187	402,926	9/1/11
SRS	SR-SF03	RBOF Spent Nuclear Fuel Project	378,177	15,373	19,155	18,206	11,773	313,670	9/1/12
SRS	SR-SF04	Heavy Water - D Area	41,972	14,699	16,133	11,140	0	n/a	n/a
SRS	SR-SF04-LT	Heavy Water - D Area (Post 2006)	49,187	0	0	0	4,984	44,203	TBD [b]
SRS	SR-SF06	Alternate Technology Project	33,533	10,169	4,592	3,985	3,723	See below [a]	9/1/06
SRS	SR-SF07	Disassembly Basin Upgrade Line Item	10,053	7,662	2,470	114	0	See below [a]	9/30/98
SRS	SR-SF09	Spent Nuclear Fuel Treatment and Storage	1,760,147	2,732	950	1,455	11,500	1,743,510	9/1/35
SRS	SR-SW01	Consolidated Incinerator Facility	1,198,371	31,224	24,873	23,255	26,045	1,092,974	9/30/30
SRS	SR-SW02	Transuranic Waste Project	965,961	9,733	9,220	13,991	10,602	922,415	9/30/29
SRS	SR-SW03	Mixed Low Level Waste Project	357,514	7,526	2,854	4,994	5,845	336,295	9/30/32
SRS	SR-SW04	Low Level Waste Project	441,288	7,995	8,602	12,150	9,947	402,594	3/31/29
SRS	SR-SW05	Hazardous Waste Project	126,336	6,477	5,468	4,901	3,971	105,519	9/1/24
SRS	SR-SW06	Sanitary Waste Project	64,914	3,197	1,747	2,068	2,156	55,746	9/1/32
SRS	SR-SW07	Pollution Prevention	114,669	0	4,679	1,710	1,122	107,158	9/1/24
SR Ops	HQNP-SI01-LT-SR	Security Investigations	TBD	0	0	1,804	1,800	TBD	TBD
Subtotal, Savannah River				1,148,168	1,127,923	1,214,946	1,222,500		

[a] EM is refining the life-cycle cost estimate for this project based upon the current and historic levels of appropriations and the resulting unappropriated balance.

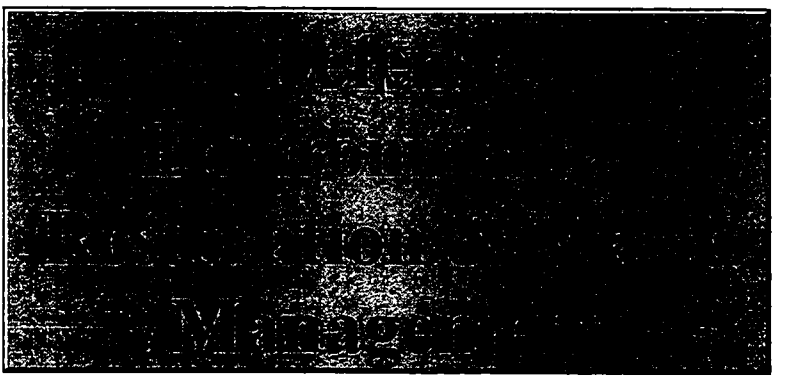
[b] A change in mission requires this project to be moved from the Site/Project Completion program account to the Post-2006 Completion account.

Ops Office/ Installation	Project Number	Project Name	(dollars in thousands) Costs: EM Baseline (current $) [a] 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
Multi-Site [a]									
HQ	HQ-6002	Support to Transition Activities	TBD	7,462	5,823	2,735	3,617	TBD	TBD
HQ	HQ-EM74	Headquarters Program Integration	130,379	10,448	9,182	8,108	9,081	93,560	TBD
HQ	HQ-100-AA	Technical Support to ER	TBD	3,504	8,672	720	690	TBD	TBD
HQ	HQ-2-00	Technical Support to ER (Non-Def)	TBD	9,321	5,193	5,418	5,304	TBD	TBD
HQ	HQ-WM001	Complex-Wide Waste Management Support and Analyses	TBD	4,146	14,851	2,728	2,610	TBD	TBD
Multi-Site	HQ-PM-001	Policy & Management	TBD	23,155	19,738	27,533	23,190	TBD	TBD
Multi-Site	HQNP-NCST	Nuclear Criticality Safety Training	TBD	0	0	3,000	3,750	TBD	TBD
Multi-Site	OPS/HQ-PP	Pollution Prevention	188,020	23,153	23,575	12,790	7,138	121,364	10/1/10
Multi-Site	OPS/HQ-PP-N	Pollution Prevention (Non-Def)	TBD	1,341	897	100	100	TBD	10/1/10
Multi-Site	HQ-TMHQ1	Transportation and Packaging Mgmt	887,456	12,764	10,509	11,918	11,753	840,512	9/30/70
Multi-Site	ID-CMP-001	National Analytical Mgmt Program	TBD	5,817	5,205	3,000	3,000	TBD	TBD
Multi-Site	HQ-EM-HQ-001	Emergency Preparedness Program	TBD	3,484	3,259	3,218	2,849	TBD	TBD
Multi-Site	HQ-EM75	Environmental & Regulatory Analysis	11,388	733	1,501	518	300	8,336	TBD
Multi-Site	HQ-PC-001	Packaging Certification	TBD	0	4,648	3,756	3,716	TBD	TBD
Subtotal, Multi-Site				105,328	113,053	85,542	77,098		
n/a	HQ-9999-01	Contribution to the UE D&D Fund	TBD	376,648	388,000	398,088	420,000	TBD	TBD
HQ	HQ-4000	Reimbursements to Uranium/Thorium Licensees	TBD	34,000	40,000	30,000	30,000	TBD	TBD
Various Loc	multiple	Science and Technology	3,322,500	351,919	269,213	243,156	230,500	2,227,712	9/30/20
Various Loc	HQ-PD-XX	Program Direction	13,203,701	411,011	345,000	337,073	349,409	11,761,208	TBD

[a] EM is refining the life-cycle cost estimates for all Multi-Site projects.

(dollars in thousands)

Ops Office/ Installation	Project Number	Project Name	Costs: EM Baseline (current $) * 1997-2070	Budget Authority: Prior Year (FY 1997)	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request	Unapprop-riated Balance	Planned Compl. Date
Subtotal, EM				6,222,896	6,020,367	6,008,525	6,120,000		
D&D Fund Deposit (Offset)				-376,648	-388,000	-398,088	-420,000		
Use of Prior Year Balances				-177,055	-11,253	-20,658	0		
Pension Refund Offset				-8,000	0	0	0		
Y2K Supplemental Appropriation				0	0	13,840	0		
FFTF (transferred to NE in FY 1999)				0	41,727	0	0		
Total, Traditional Budget Authority				5,661,193	5,662,841	5,603,619	5,700,000		
Privatization				330,000	200,000	228,357	228,000		
Total, EM				5,991,193	5,862,841	5,831,976	5,928,000		



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Defense Environmental Restoration and Waste Management

Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction and acquisition of plant and capital equipment and other expenses necessary for atomic energy defense environmental restoration and waste management activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; and the purchase of [passenger motor vehicles (not to exceed 3 new sedans and 6 for replacement only, of which 3 are sedans, 2 are buses, and 1 is an ambulance, $4,310,227,000] *35 passenger motor vehicles for replacement only, $4,514,376,000,* to remain available until expended *of which $8,700,000 shall be derived from excess pension payment refunds. Further, for the foregoing purposes, $4,505,676,000, to become available October 1, 2000, and to remain available until expended. (Energy and Water Development Appropriations Act, 1999.)*

Explanation of Change

Change in appropriation language relates to the number of motor vehicles, and provides for two years of appropriation.

Defense Environmental Restoration and Waste Management

Program Mission

The Environmental Management (EM) program is responsible for managing and addressing the environmental legacy resulting from the production of nuclear weapons and nuclear research. The nuclear weapons complex generated waste, pollution, and contamination which pose unique problems, including unprecedented volumes of contaminated soil and water, radiological hazards from special nuclear material, and a vast number of contaminated structures. Factories, laboratories, and thousands of square miles of land were devoted to the enterprise of producing tens of thousands of nuclear weapons in the name of national security. Much of this massive infrastructure, waste, and contamination still exists and is largely maintained, decommissioned, managed, and remediated by the EM program, which is sometimes referred to as the "cleanup program." EM's responsibilities include facilities and areas at 113 geographic sites (excluding the 21 sites in the Formerly Utilized Sites Remedial Action Project transferred to the U.S. Army Corps of Engineers). These sites are located in 30 states and one territory and occupy an area equal to that of Rhode Island and Delaware combined -- or about 2 million acres.

The FY 2000 request for the Defense Environmental Restoration and Waste Management appropriation is $4,494,376,000, an increase of $185,809,000 from the FY 1999 current appropriation level of $4,308,567,000.

Program Goal

The EM program has established a goal of cleaning up as many of its contaminated sites as possible by 2006 in a safe and cost-effective manner. By working towards this goal, EM can reduce the hazards presently facing its workforce and the public, and reduce the financial burden on the taxpayer. The FY 2000 budget request continues to reflect the program's emphasis on site closure and project completion

Program Objectives

- Continue to address the most serious environmental risks across the DOE complex and ensure that facilities and activities pose no undue risks to the public and worker safety and health.
- Continue to be substantially in compliance with applicable environmental and other requirements and meet compliance milestones.
- Continue surveillance and maintenance of facilities.

Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component of the effort to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Albuquerque Operations Office	18,120	8,080	5,550	-2,530	-31.3%
Grand Junction Office	8,000	1,200	1,200	0	0.0%
Kansas City Plant	3,513	1,756	1,100	-656	-37.4%
Los Alamos National Laboratory	130,340	79,963	104,834	24,871	31.1%
Pantex Plant	23,243	11,299	15,000	3,701	32.8%
Pinellas Plant	2,318	2,797	5,500	2,703	96.6%
Sandia National Laboratories	48,368	27,260	19,435	-7,825	-28.7%
Total, Albuquerque Operations Office	233,902	132,355	152,619	20,264	15.3%
Carlsbad Area Office					
Waste Isolation Pilot Plant	173,700	185,404	186,404	1,000	0.5%
Chicago Operations Office					
Ames Laboratory	103	0	0	0	0.0%
Argonne National Laboratory-East	4,153	0	0	0	0.0%
Chicago Operations Office	241	0	0	0	0.0%
Total, Chicago Operations Office	4,497	0	0	0	0.0%

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Idaho Operations Office					
Idaho National Engineering and Environmental Laboratory	408,055	425,615	400,214	-25,401	-6.0%
Nevada Operations Office					
Nevada Operations Office	3,933	7,036	8,634	1,598	22.7%
Nevada Test Site	64,985	73,045	76,673	3,628	5.0%
Total, Nevada Operations Office	68,918	80,081	85,307	5,226	6.5%
Oakland Operations Office					
Lawrence Livermore National Laboratory	54,210	49,214	49,891	677	1.4%
Oakland Operations Office	2,192	2,700	800	-1,900	-70.4%
Separations Process Research Unit	0	0	500	500	>999%
Total, Oakland Operations Office	56,402	51,914	51,191	-723	-1.4%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	7,920	0	57,805	57,805	>999%
Oak Ridge Operations Office	398	3,559	4,725	1,166	32.8%
Oak Ridge Reservation	190,039	164,029	186,622	22,593	13.8%
Off-site Locations	26,468	9,168	15,409	6,241	68.1%
Total, Oak Ridge Operations Office	224,825	176,756	264,561	87,805	49.7%
Richland Operations Office					
Hanford Site	887,808	951,138	1,026,862	75,724	8.0%
Richland Operations Office	44,536	45,491	36,831	-8,660	-19.0%
Total, Richland Operations Office	932,344	996,629	1,063,693	67,064	6.7%
Savannah River					
Savannah River Operations Office	28,117	33,157	30,280	-2,877	-8.7%
Savannah River Site	1,095,558	1,181,789	1,192,220	10,431	0.9%
Total, Savannah River Operations Office	1,123,675	1,214,946	1,222,500	7,554	0.6%
Multi-Site Activities	102,315	76,268	67,978	-8,290	-10.9%
Science and Technology	269,213	243,156	230,500	-12,656	-5.2%
Program Direction	345,000	337,073	349,409	12,336	3.7%
D&D Fund Deposit	388,000	398,088	420,000	21,912	5.5%
FY 1999 activities funded by prior year bal	0	5,900	0	n/a	n/a

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Subtotal, Defense ER&WM	4,330,846	4,324,185	4,494,376	176,091	4.1%
Use of Prior Year Balances (to satisfy Congressional offset)	-11,253	-20,058	0	20,058	-100.0%
Use of Prior Year Balances (to finance FY 1999 activities)	0	-5,900	0	n/a	n/a
Y2K Supplemental Appropriation	0	10,340	0	-10,340	>999%
Total, Defense ER&WM	4,319,593	4,308,567	4,494,376	185,809	9.0%

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act (1977)"

Public Law 103-62, "Government Performance and Results Act of 1993"

Public Law 105-245, "The Energy and Water Development Appropriations Act, Fiscal Year 1999"

Public Law 105-261, "National Defense Authorization Act, Fiscal Year 1999"

Public Law 102-579, "Waste Isolation Pilot Plant Land Withdrawal Act (1992)"

Site/Project Completion

Program Mission

The Defense Site/Project Completion account provides funding for projects that are expected to be completed by FY 2006 at sites or facilities where a Department of Energy (DOE) mission will continue (e.g., environmental management, nuclear weapons stockpile stewardship or scientific research) beyond FY 2006. Hence, this account focuses on the completion of specific Environmental Management (EM) projects at sites where the Department anticipates continuing missions.

This account includes projects and sites under the following operations offices: Albuquerque, Idaho, Oakland, Richland, and Savannah River. Although the largest amount of funding for Site/Project Completion activities is in the Defense Environmental Restoration and Waste Management appropriation, a greater number of sites in this account are funded in the Non-Defense Environmental Management appropriation.

In a limited number of cases, sites have been placed in the Site/Project Completion account even though there is no expectation of a continuing mission after cleanup is completed. In these instances, use of the Site Closure account would have created an additional appropriation control for an Operations/Field office with a limited amount of associated funding, thereby hindering managerial flexibility in the execution of projects at these sites.

Program Goal

The FY 2000 budget request will enable the EM program to continue its goal of completing its cleanup mission at as many sites as possible by 2006. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths To Closure* document, whereby EM sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules.

Program Objectives

- To continue environmental cleanup projects that are expected to be completed by 2006 at EM sites where overall site cleanup will not be fully accomplished by 2006.
- To continue environmental cleanup projects at DOE sites where all EM projects are expected to be completed by 2006 (except for long-term stewardship activities), but where there will be a continuing federal workforce at the site to carry out enduring non-EM missions, such as nuclear weapons activities or scientific research, and the necessary waste management activities to handle newly generated wastes from these missions.

Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component of the effort to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	101,687	56,412	46,835	-9,577	-17.0%
Chicago Operations Office	4,497	0	0	0	0.0%
Idaho Operations Office	103,675	108,569	108,961	392	0.4%
Oakland Operations Office	56,402	51,914	51,191	-723	-1.4%
Richland Operations Office	285,146	330,637	376,296	45,659	13.8%
Savannah River Operations Office	413,520	481,915	397,636	-84,279	-17.5%
Total, Site/Project Completion, Defense	964,927	1,029,447	980,919	-48,528	-4.7%

Public Law Authorization:

Public Law 105-245, "The Energy and Water Development Appropriations Act, 1999"

Public Law 95-91, "Department of Energy Organization Act (1997)"

Public Law 103-62, "Government Performance and Results Act of 1993"

Public Law 105-261, "Strom Thurmond National Defense Authorization Act for Fiscal Year 1999"

Albuquerque

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management, Site/Project Completion Program, carried out by the Albuquerque Operations Office, is to support cleanup activities at seven geographic sites in six states. These sites include the Kansas City Plant in Missouri; the Pantex Plant in Texas; the Sandia National Laboratory sites in California and New Mexico; the Maxey Flats site in Kentucky; the Pinellas Plant in Florida; and the South Valley Superfund Site in New Mexico.

The Albuquerque Operations Office also has responsibility for miscellaneous programs such as the Waste Management Education and Research Consortium, Historically Black Colleges and Universities, Innovative Treatment Remediation Demonstration Program, Norfolk State University Center, and Agreements in Principle with Texas and Missouri.

Program Goal

The Albuquerque Operations Office goal is to complete cleanup of all geographic sites under its cognizance in this account by FY 2006. The cleanup of the Kansas City Plant and the Sandia National Laboratories/California sites will be completed in FY 1999; the cleanup of the Pantex Plant will be completed in FY 2001; the Sandia National Laboratories/New Mexico site will be completed in FY 2003, and the cleanup and transition of the Kansas City Plant to the Office of Defense Programs is planned to be completed in FY 2004. These sites have continuing Defense Programs missions. The assumption is that any required surveillance and maintenance and ground water monitoring activities will be funded by Defense Programs, although this has not been discussed formally with Defense Programs yet. Groundwater remediation, the only remaining cleanup activity at the Pinellas Plant will continue to about FY 2014. The DOE's responsibility as a potentially responsible party for the Comprehensive Environmental Response, Compensation, and Liability Act-required remedial action activities at the Maxey Flats Disposal Site will be satisfied by FY 2002, when the last potentially responsible party payment is made.

Program Objectives

Historically, the Albuquerque Operations Office's primary mission has been to manage sites that were involved in the research, development, production and maintenance of nuclear weapons.

The objective of the program is to have all identified Environmental Restoration sites remediated and waste disposed of in an on-site disposal cell or at an off-site location. Nearly all of the land is expected

to be available for other programmatic uses by around FY 2003, with monitoring continuing at several sites.

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the Detail Justification.

Significant Accomplishments and Program Shifts

Kansas City Plant

- Transferred the Kansas City Waste Management activities to the Office of Defense Programs (FY 1998).
- Installed Iron Filing Wall for in-situ groundwater treatment and containment (FY 1998)
- Received Environmental Protection Agency acceptance to use industrial standards for ground water and soil cleanup in lieu of residential standards (FY 1998)
- Completed interim remediation (test cell tanks) at Motor Vehicle Repair Sump Site (FY 1998).
- Completed interim remediation at Trichlorethylene Still Area location (FY 1998).
- Completed and implemented a Transition Plan for long-term surveillance and maintenance responsibilities following completion of the restoration program to the landlord (Defense Programs) in FY 2004 (FY 1998).
- Complete all Environmental Protection Agency required investigative activities for the 95th Terrace Site and resubmit the Resource Conservation and Recovery Act Facility Investigation Report proposing no further action (FY 1999).
- Complete groundwater treatment analysis to determine effectiveness of Iron Filing Wall for in-situ treatment and containment of contaminated plume (FY 1999).
- Complete transition from Environmental Protection Agency Consent Order to State (Missouri) Post Closure Permit (FY 1999).

Pantex Plant

- Submitted a petition to delete the Pantex Plant from the National Priorities List pursuant to the Environmental Protection Agency's interim policy change. The deletion will eliminate dual reporting and response actions under the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act, allowing the Environmental Restoration Program regulation under the Resource Conservation and Recovery Act Part B Permit. (FY 1998)

- Completed Phase IV groundwater treatability study; installed six borings, five perched monitoring wells, and four extraction wells; and completed treatability report. (FY 1998)
- Cleaned up or recommended no further action for 246 of 249 release sites (FY 1998). Remediation or recommendation for no further action will be completed for the 3 remaining major sites in FY 2001.
- Treated, stored, and disposed of newly generated mixed low-level waste according to Site Treatment Plans for Sandia Laboratories and Pantex (FY 1998).
- Supported construction of new Hazardous Waste Treatment and Processing Facility at Pantex (FY 1998).
- Transition waste management responsibilities for newly generated waste at Pantex to Defense Programs (FY 1999).
- Completed Landfills Corrective Measures Study, six final Resource Conservation and Recovery Act Facility Investigation Reports, and Groundwater Corrective Measures Study (FY 1998) and start Corrective Measure Implementation for Groundwater, Landfills; start and complete Burning Grounds Interim Corrective Measures, High Explosives/Radiation Sites, and Biovent Treatability Study (FY 1999).
- Completed remediation of depleted uranium contamination at Firing Site #5 (FY 1998).
- Completed accelerated remediation for nine release sites (FY 1998).
- Conducted site-wide risk assessments to support closure of 15 release sites (FY 1998).
- Complete additional Resource Conservation and Recovery Act Facilty Investigation at Old Sewage Treatment Plant, and complete three final Resource Conservation and Recovery Act Facility Investigation Reports (FY 1999).

Sandia Environmental Restoration Project

- Constructed and operated Corrective Action Management Unit; continued remediation of Chemical Waste Landfill, Foothills Test Area, Tijeras Arroyo, and Central Coyote Test Area (FY 1998).
- Completed remediation of the Sandia/California Navy Landfill (FY 1998).
- Submitted to State Regulator 16 release sites for No Further Action (FY 1998).
- Conducted assessment of Technical Area 315 Groundwater; continued remediation of Technical Areas 1 and 2 (Classified Waste Landfill) and Canyons Test Area (FY 1998).
- Complete site-wide characterization (FY 1999).
- Submit to State regulators 26 release sites for No Further Action (FY 1999).
- Complete remediation of Sandia/California Fuel Oil Spill (FY 1999).
- Conduct assessment of Sandia North groundwater and remediation of Technical Area 2 and conduct assessment and remediation of Southwest Test Area and Canyons Test Area and Mixed Waste Landfill (FY 1999).

- Transfer waste management activities at Sandia National Laboratories to Defense Programs (FY 1999).

Pinellas Plant

- Completed closeout of administrative activities and vacated the Pinellas Site; continued long-term groundwater remediation activities. (FY 1998).

Program Shift

- The Office of Defense Programs has taken financial and programmatic responsibility for the waste management activities in FY 1999.
- The completion end dates for Sandia National Laboratories and Kansas City Plant are being extended beyond previous baseline schedules due to new scope being identified at both locations that will take longer to complete than previously believed.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AL-002 / Albuquerque Miscellaneous Programs	16,245	7,100	4,600	-2,500	-35.2%
AL-007 / Environmental Restoration, Kansas City	3,513	1,756	1,100	-656	-37.4%
AL-014 / Pantex Plant Site Remediation Project	11,161	11,299	15,000	3,701	32.8%
AL-015 / Pantex Waste Operations	12,082	0	0	0	0.0%
AL-017 / Sandia National Laboratories Waste Management	19,908	0	0	0	0.0%
AL-018 / Sandia ER Project	28,460	27,260	19,435	-7,825	-28.7%
AL-019 / Pinellas Plant Close-out and Administration of Post-Employment Benefits	-451	501	3,000	2,499	498.8%
AL-021 / Maxey Flats Field Management Project	8,000	1,200	1,200	0	0.0%
AL-025 / Ground Water Clean-Up (Pinellas)	2,769	2,296	2,500	204	8.9%
AL-029 / TA-21 Cleanup	0	5,000	0	-5,000	-100.0%
Total, Albuquerque	101,687	56,412	46,835	-9,577	-17.0%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Kansas City Plant	3,513	1,756	1,100	-656	-37.4%
Los Alamos National Laboratory	0	5,000	0	-5,000	-100.0%
Maxey Flats	8,000	1,200	1,200	0	0.0%
Pantex Plant	23,243	11,299	15,000	3,701	32.8%
Pinellas Plant	2,318	2,797	5,500	2,703	96.6%
Sandia National Laboratories	48,368	27,260	19,435	-7,825	-28.7%
South Valley	0	0	0	0	0.0%
Albuquerque Operations Office	16,245	7,100	4,600	-2,500	-35.2%
Total, Albuquerque	101,687	56,412	46,835	-9,577	-17.0%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
▪ Assessments	3.0	1.0	0.0
▪ Cleanups	41.0	15.0	10.0
Transuranic Waste			
▪ Storage (m^3)	25.5	0.0	0.0
Mixed Low-Level Waste			
▪ Storage (m^3)	146.4	0.0	0.0
▪ Treatment (m^3)	73.5	0.0	0.0
▪ Disposed On-site/Commercial (m^3)	5.0	0.0	0.0
▪ Shipped to DOE Disposal Site (m^3)	1.0	0.0	0.0
Low-Level Waste			
▪ Storage (m^3)	998.3	0.0	0.0
▪ Treatment (m^3)	72.7	0.0	0.0
▪ Shipped to DOE Disposal Site (m^3)	512.1	0.0	0.0
Hazardous Waste			
▪ Disposed (MT)	414.9	0.0	0.0

Site Description

Kansas City Plant

The Kansas City Plant is part of a Federal complex located in south Kansas City, Missouri. In FY 1993, the Department shut down several facilities across the country and consolidated the production of non-nuclear components for nuclear weapons at the Kansas City Plant. The site is comprised of

43 release sites, all of which will be completed by the end of FY 2004. This will complete remediation actions required by State and Federal regulators. Advanced technologies are being employed to reduce soil contamination (microwave enhanced volatilization technology) and to reduce groundwater cleanup time and cost (Iron Filing Trench treatment wall). Activities necessary to transition to a steady state Environmental Restoration Program will also be accomplished in FY 2004. Institutional controls and groundwater treatment and monitoring will continue indefinitely beyond FY 2000. Beginning in FY 1998, the Office of Defense Programs took financial and programmatic responsibility for waste management activities.

Pantex Plant

The Pantex Plant is located near Amarillo, Texas, and has responsibility for dismantlement and maintenance of the Nation's nuclear weapons stockpile and storage of plutonium from dismantled weapons. At the Pantex Plant, the EM activities consist primarily of storage, treatment, and disposal of various waste types and cleanup of contaminated soils and ground water. In FY 1994, the site was placed on the National Priorities List, thereby requiring remediation under the Comprehensive Environmental Response, Compensation, and Liability Act authority. The Pantex Plant is comprised of 249 release sites, of which 246 have been either cleaned up or recommended for no further action; the remaining three need extensive cleanup activities and will be completed in FY 2001, which will complete the remediation of this site. Ground water pump and treat will likely need to continue well past this date; however, technology development activities are underway through the Innovative Technology Research and Development program to try to accelerate groundwater cleanup at the Pantex Plant. Beginning in FY 1999, the Office of Defense Programs has financial and programmatic responsibility for waste management activities.

Sandia National Laboratories-California

The Sandia National Laboratories-California facility is located adjacent to the Lawrence Livermore National Laboratory in California. Major restoration activities include the cleanup of a 59,000 gallon diesel fuel oil spill from an underground transfer pipe. The key to complete remediation of this facility in FY 1999 is using advanced technology (bioremediation). In FY 1999, waste management activities have been transferred to the Office of Defense Programs.

Sandia National Laboratories-New Mexico

The Sandia National Laboratories-New Mexico site located in Albuquerque, New Mexico, is a research and development facility with a primary mission of developing, engineering, and testing non-nuclear components of nuclear weapons. In FY 1999, disposal of more than 90 percent of its historical/legacy low-level waste and mixed low-level waste will be completed. Major restoration efforts involve the remediation of inactive waste disposal and release sites at Albuquerque and a number of other remote locations. These sites have known or suspected releases of hazardous, radioactive, or mixed waste.

Another major initiative will be to close out remediation activities at all of the release sites by FY 2003. The original baseline, which is reflected in this budget, will be adjusted because additional contamination has been found at the chemical and classified waste landfills requiring additional remediation. In FY 1999, waste management activities have been transferred to the Office of Defense Programs.

Pinellas Plant

In September 1997, remediation of the Pinellas Plant was completed and the site was transferred to Pinellas County. In December 1998, DOE completed all remaining administrative closeout activities at Pinellas and vacated the site, except for continuing groundwater remediation to be overseen by the Grand Junction Office. In FY 1999 and FY 2000, DOE will continue annual payments for Pinellas post-contract medical, pension, and other contractor worker retirement benefits. In FY 1998 and FY 1999, operation and maintenance of groundwater remediation systems at the Building 100 and Old Drum Storage Sites, the Northeast Site, 4.5 Acre Site, and the Wastewater Neutralization/Building 200 Area will continue. Bio-remediation will take place at the Northeast Site and Building 100, and will continue into FY 2000

South Valley

The Department is a potentially responsible party at the South Valley site in New Mexico. The one release site at South Valley was completed in FY 1996. Currently ground water monitoring and ground water remediation system operation and maintenance activities are ongoing at this site. The Government has reached a liability buy-out settlement under which DOE will no longer have any financial liability for the project until the end of year 2003.

Maxey Flats

The Maxey Flats site in Kentucky is another site where DOE is responsible for contributing a potentially responsible party payment for the cleanup of the site. Maxey Flats is considered one release site. Environmental Management's last potential responsible party payment is expected in FY 2002, ending the DOE's responsibility at the site.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The sites are managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope Planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Most of the projects included in this section of the budget have had an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities.			
AL-002 / Albuquerque Miscellaneous Programs (Waste Management Education and Research Consortium, Historically Black Colleges and Universities, Innovative Treatment Remediation Demonstration Program, Norfolk State University Center for Materials Research, AIP-TX/MO)			
Provides financial assistance for grants, cooperative agreements, innovative remediation technologies, and other analytical research.			
■ Continuation of multi-year grants and cooperative agreements with the Norfolk State University Center for Materials Research, Waste Management Education and Research Consortium, and Historically Black Colleges and Universities consortium.			
■ Continuation of the Innovative Treatment Remediation Demonstration Program, which is a cooperative effort among DOE, the Environmental Protection Agency, and industry to generate full-scale and real-world treatment and performance data for selected innovative technologies to accelerate their acceptance and use nationwide.			
■ Continuation of agreements-in-principle with the States of Texas and Missouri.			
AL-002	16,245	7,100	4,600

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
AL-007 / Environmental Restoration (Kansas City Plant)			
This project evaluates potentially contaminated areas and cleans up areas found to be a threat to human health or the environment.			
■ Activities at the Kansas City Plant will be limited to groundwater treatment and monitoring to keep contamination out of Indian Creek and Blue River.			
AL-007	3,513	1,756	1,100
Metrics			
Remedial Action			
Cleanups	5.0	0.0	0.0
AL-014 / Pantex Plant Site Remediation Project			
This project provides for cleanup of contaminated soils and groundwater resulting from production and testing of explosive components for nuclear weapons. Remediation methodologies incorporated in this effort include excavation and off-site disposal of soils contaminated with high explosives/radionuclides, recirculation and filtration of groundwater, and a Resource Conservation and Recovery Act landfill cap. These efforts are in accordance with and meet the Resource Conservation and Recovery Act requirements.			
■ Complete site-wide risk assessment.			
■ Complete groundwater, landfills and high explosive/radiation corrective measures.			
■ Complete additional Resource Conservation and Recovery Act Facility Investigation Characterization for Active Firing Sites.			
■ Complete Burning Grounds Interim Corrective Measures, and begin post-remediation long-term surveillance and maintenance.			
■ Complete four Final Resource Conservation and Recovery Act Facility Investigation Reports.			
■ Implement Field Scale Soil Composting System.			
■ Conduct groundwater remediation and monitoring.			
AL-014	11,161	11,299	15,000

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action			
Assessments	2.0	1.0	0.0
Cleanups	24.0	0.0	1.0

AL-015 / Pantex Waste Operations

Responsibility for management of all newly generated waste was transferred to the Office of Defense Programs in FY 1999.

- No activity.

AL-015	12,082	0	0

Metrics			
Mixed Low-Level Waste			
Storage (m^3)	65.8	0.0	0.0
Treatment (m^3)	23.5	0.0	0.0
Low-Level Waste			
Storage (m^3)	186.4	0.0	0.0
Treatment (m^3)	51.4	0.0	0.0
Shipped to DOE Disposal Site (m^3)	360.4	0.0	0.0
Hazardous Waste			
Disposed (MT)	227.2	0.0	0.0

AL-017 / Sandia National Laboratories Waste Management

Responsibility for management of all newly generated waste was transferred to the Office of Defense Programs in FY 1999.

- No activity.

AL-017	19,908	0	0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Transuranic Waste			
Storage (m^3)	25.5	0.0	0.0
Mixed Low-Level Waste			
Storage (m^3)	80.6	0.0	0.0
Treatment (m^3)	50.0	0.0	0.0
Disposed On-site/Commercial (m^3)	5.0	0.0	0.0
Shipped to DOE Disposal Site (m^3)	1.0	0.0	0.0
Low-Level Waste			
Storage (m^3)	811.9	0.0	0.0
Treatment (m^3)	21.3	0.0	0.0
Shipped to DOE Disposal Site (m^3)	151.7	0.0	0.0
Hazardous Waste			
Disposed (MT)	187.7	0.0	0.0

AL-018 / Sandia ER Project

The mission of the Sandia Environmental Restoration Project is to complete all necessary corrective actions (assessment and remediation) at environmental restoration sites in the most expeditious and cost-effective manner, while minimizing worker, public health, and environmental risks, satisfying public concerns, and complying with all applicable federal, state and local laws. All of the designated solid waste management units and additional areas of concern will be remediated or placed under management controls adequate to ensure agreement of the federal and state regulatory authorities that, based on risk to humans or the environment, no further action is warranted.

- Complete Corrective Action Management Unit operations, continue remediation of Chemical Waste Landfill.
- Complete assessment of Tech Area 2 Groundwater, and complete remediation of canyons and southwest test areas.
- Complete compliance monitoring of Sandia/California.
- Continue assessment/remediation of Mixed Waste Landfill.
- Complete remediation of Foothills Test Area, Tijeras Arroyo, Central Coyote Test Area, and Tech Area 315 groundwater
- Continue remediation of Tech Area I, and complete septic system remediations.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Submit four release sites for no further action.			
AL-018	28,460	27,260	19,435
Metrics			
Remedial Action			
Cleanups	12.0	15.0	9.0

AL-019 / Pinellas Plant Close-out and Administration of Post-Employment Benefits

This project oversees final contract closeout/transition activities; employee reduction-in-force requirements; and administration of DOE liabilities associated with contractor employee benefits.

- DOE would reimburse Lockheed Martin Corporation for payments the firm makes to former Pinellas contractor employees, primarily for pension, medical, life insurance, and retirement benefits.
- The FY 1998 estimate reflects a deobligation of new Budget Authority. Activities were funded in FY 1998 using prior year carryover.

AL-019	-451	501	3,000

Metrics

No quantifiable corporate performance measures are associated with this project.

AL-021 / Maxey Flats Field Management Project

This project fulfills the Department's responsibilities as a potentially responsible party for Comprehensive Environmental Response, Compensation, and Liability Act-required remedial action at the Maxey Flats Disposal Site, Kentucky.

- Make required Consent Decree potential responsible party payment to the Maxey Flats Steering Committee.

AL-021	8,000	1,200	1,200

Metrics

No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
AL-025 / Ground Water Clean-Up (Pinellas)			
This project includes all tasks associated with groundwater cleanup at Pinellas, and response to liability under the Comprehensive Environmental Response, Compensation, and Liability Act for former off-site disposal.			
■ Conduct operation and maintenance of remediation systems at the Building 100 and Old Drum Storage Sites, the Northeast Site, 4.5 acre site, and the Wastewater Neutralization/Building 200 Area.			
■ Conduct site-wide groundwater monitoring activities.			
■ Conduct bio-remediation at the Northeast Site and Building 100.			
AL-025	2,769	2,296	2,500
Metrics			
Remedial Action			
Assessments	1.0	0.0	0.0
AL-029 / TA-21 Cleanup			
This project was created by Congress in FY 1999 for the purpose of preparing a detailed project plan, including cost and schedule, having the plan independently assessed, and submitting the plan with the FY 2000 budget request.			
AL-029	0	5,000	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
Total, Albuquerque	101,687	56,412	46,835

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
AL-002 / Albuquerque Miscellaneous Programs	
■ Decrease reflects less financial assistance for grants, cooperative agreements, and analytical research as programs are completed	-2,500
AL-007 / Environmental Restoration (Kansas City Plant)	
■ Reflects completion of remediation activities and transition to long-term monitoring and surveillance at the Kansas City Plant	-656
AL-014 / Pantex Plant Site Remediation Project	
■ Increase is for completion of all remediations at the Pantex Plant	3,701
AL-018 / Sandia ER Project	
■ Reflects completion of Sandia-Livermore remediation activities in FY 1999. At Sandia-Albuquerque, reflects completion of most remediation activities except for work on two landfills and a disposal cell	-7,825
AL-019 / Pinellas Plant Close-Out and Administration of Post-Employment Benefits	
■ Reflects total cost of post-employment benefits. Used prior year carryover to fund the project at a level above the budget authority reflected in FY 1999, and at the same level shown in FY 2000	2,499
AL-025 / Ground Water Clean-Up (Pinellas)	
■ Reflects slight increase in operation and maintenance costs	204
AL-029/ TA-21 Cleanup	
■ Reflects completion of Congressionally Mandated Report in FY 1999 and continued characterization of material disposal areas, decontamination and decommissioning project planning, and close-out of other release sites	-5,000
Total Funding Change, Albuquerque	-9,577

Chicago

Mission Supporting Goals and Objectives

Mission

The mission of the Defense funded Environmental Management (EM) Site/Project Completion program carried out by the Chicago Operations Office is to support projects that will be completed by FY 2006 at sites or facilities where a Department of Energy mission such as the Office of Science or Nuclear Energy research will continue. Chicago Operations Office managed activities have been conducted at three sites in two states. These include the Ames Laboratory in Iowa; and the Argonne National Laboratory-East site in Illinois. The Chicago Operations Office manages, coordinates, tracks, and assists in the implementation of programs among various sites. The majority of activities managed by the Chicago Operations Office have been funded in the Non-Defense account. The FY 1999 and the FY 2000 Defense account budget requests include no funding for Chicago activities. All defense-related efforts were completed by the end of FY 1998.

Program Goal

The Chicago Operations Office is committed to ensuring its facilities and activities pose no undue risk to the public, worker health and safety, maintaining compliance with applicable environmental and other requirements, and working aggressively to clean up as many sites as possible by 2006 to reduce outyear costs and, reducing life cycle costs and schedules.

Program Objectives

Beginning in FY 1999, there are no defense-funded activities remaining at the Chicago Operations Office. All activities will be supported under the non-defense EM Site/Project Completion account. All prior defense-funded activities; e.g., Site A, have been completed. The Chicago Operations Office proactively employs innovative and alternative technologies, wherever appropriate and applicable, to address remedial as well as decontamination and decommissioning problems in order to reduce cost and risk, and to improve the schedule.

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the Detail Justification.

Significant Accomplishments and Program Shifts

FY 1998 accomplishments under defense funding included quarterly monitoring well and surface water sampling related to the remediated Chemical Disposal Site at Ames Laboratory. Ongoing monitoring also continued at Site A/Plot M. At Argonne National Laboratory - East, decontamination and decommissioning activities consisted of: (1) assessment of 22 facilities including the Argonne Thermal Source Reactor, Building 579, the 60" Cyclotron and the Building 301 Hot Cells; (2) completion of four facility cleanups including two facilities at the Chicago Pile 5 Test Reactor, deploying innovative technologies, and two at the Argonne Thermal Source Reactor; (3) completion of further application recommendations for 22 Chicago Pile 5 Test Reactor technology demonstrations; and (4) continuation of surveillance and maintenance. Use of technology development initiatives include a large scale demonstration project and a public/private sector partnership. These demonstrations allow rapid comparison of a variety of commercially-available and innovative technologies and possible use of lower-cost technologies for the Chicago Pile 5 Test Reactor decommissioning. Cost sharing is provided by private industry and utilities, and results of the demonstrations are being considered for use at other Argonne National Laboratory-East facilities, and at other DOE facilities, such as Hanford, Oak Ridge, and Idaho National Engineering and Environmental Laboratory, as well as at private and utility sites.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
CH-AMESRA / Ames Remedial Actions	103	0	0	0	0.0%
CH-ANLEDD / Argonne National Laboratory-East Decontamination and Decommissioning	4,075	0	0	0	0.0%
CH-ANLEPM-D / Argonne National Laboratory-East Program Management	78	0	0	0	0.0%
CH-CHOOSM-D / Surveillance and Maintenance Activities	221	0	0	0	0.0%
CH-COPS-D / Chicago Operations Program Support	20	0	0	0	0.0%
Total, Chicago	4,497	0	0	0	0.0%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AMES Laboratory (Iowa State University) (IA)	103	0	0	0	0.0%
Argonne National Laboratory - East (IL)	4,153	0	0	0	0.0%
Chicago Operations Office (IL)	241	0	0	0	0.0%
Total, Chicago	4,497	0	0	0	0.0%

Site Description

AMES Laboratory (Iowa State University)

Ames Laboratory is an Energy Research laboratory in Ames, Iowa that conducts basic and applied research in the preparation, characterization, and evaluation of properties of metals and their alloys, especially rare earth metals. Ames Laboratory also performs materials research, high-performance computing, and environmental research. It seeks solutions to energy-related problems through the exploration of physics, chemistry, engineering, applied mathematics, and materials sciences.

Argonne National Laboratory - East

Argonne National Laboratory - East is a research laboratory occupying a 700 acre tract of land located approximately 22 miles southwest of downtown Chicago in DuPage County, Illinois. It is an Office of Science multidisciplinary research and development laboratory that conducts basic and applied research to support the development of energy-related technologies. Energy-related research projects include safety studies for light-water reactors, developing components and materials for fission and fusion reactors, superconductivity research, improvements in coal power, synchrotron radiation sources, and waste heat utilization. Further research includes medical radioisotope technology, environmental research, genetics research, materials engineering, ceramics, carcinogenesis, and the biological effects of ionizing radiation. Argonne-East is the home for the Advanced Photon Source facility which provides experiment capability, with the use of photons, for industry, government, and academic scientists to create advances in pharmaceuticals, adhesives, food processing, and many other applications.

Site A/Plot M

Site A/Plot M is the former site of early activities by the Manhattan Engineering District between 1942 and 1956. The site is located within the Palos Forest Preserve in Cook County, Illinois and is owned by the Forest Preserve District of Cook County. Site A contained two experimental nuclear reactors and associated research laboratories. Plot M was used for the burial of radioactive waste from experimental research at Site A. Initial work involved research and the development of radioisotopes and fission products for uses in defense and non-defense activities. Removals of radiological hot spots and soils contaminated with heavy metals were completed in October 1996. Site A/Plot M is currently undergoing monitoring of groundwater, soil, and air to affirm that there is no significant spread of contamination. Responsibility for surveillance and monitoring was transferred to the Grand Junction Project Office in Spring 1998.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-AMESRA / AMES Remedial Actions			
Include quarterly monitoring well and surface water sampling to the remediated Chemical Disposal Site at Ames Laboratory. All activities are funded under non-defense in FY 1999 and beyond.			
CH-AMESRA	103	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
CH-ANLEDD-D/ Argonne National Laboratory-East Decontamination and Decommissioning			
This project conducts facility decontamination and decommissioning at the Argonne National Laboratory-East to reduce risk and comply with Atomic Energy Act provisions. All activities are funded under non-defense in FY 1999 and beyond.			
CH-ANLEDD-D	4,075	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
CH-ANLEPM-D/ Argonne National Laboratory-East Program Management			
This project provides program management support activities to provide a safe and effective environmental management program to reduce environmental and health risks. All activities are funded under non-defense in FY 1999 and beyond.			
CH-ANLEPM-D	78	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-CHOOSM-D / Surveillance and Maintenance Activities			
Responsibility for surveillance and maintenance activities for Site A/Plot M were transferred to the DOE Grand Junction Project office in FY 1998.			
CH-CHOOSM-D	221	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
CH-COPS-D / Chicago Operations Program Support (Defense)			
All Chicago funding is under non-defense in FY 1999 and beyond.			
CH-COPS-D	20	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Chicago	4,497	0	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
■ No significant changes	0
Total Funding Change, Chicago	0

Idaho

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Site/Project Completion Environmental Management (EM) program at the Idaho National Engineering and Environmental Laboratory is to safely manage and dispose of transuranic waste, mixed low-level waste, low-level waste, hazardous, and other waste, while maintaining full compliance with applicable requirements and agreements, and particularly the Idaho Settlement Agreement, and perform environmental restoration according to the Federal Facility Agreement and Consent Order.

Program Goal

The goal of this portion of the Idaho program is to complete, by 2006, cleanup of several waste streams and release sites, dispose of all Idaho National Engineering and Environmental Laboratory low-level legacy waste in FY 1999, dispose of most of the Idaho National Engineering and Environmental Laboratory mixed low-level waste by FY 2006, satisfy the Settlement Agreement requirement to ship 3,100 m^3 of transuranic waste off-site for disposal (by December 31, 2002), and have a major portion of the Idaho National Engineering and Environmental Laboratory-managed spent nuclear fuel in stable, dry storage awaiting final disposition. Low-level waste, mixed low-level waste, and other waste will be treated, stored, and disposed in compliance with regulatory requirements and agreements. Environmental Restoration activities will be completed for Waste Area Groups 1, 4, and 5.

Program Objectives

One objective of this program is to complete remediation efforts where it can be done soon, improve the site infrastructure for the long-term continuing mission, and manage waste streams, including transuranic waste shipments off-site, in order to free resources to apply to the long-term continuing cleanup of the Idaho National Engineering and Environmental Laboratory and comply with the Idaho Settlement Agreement.

Another objective of the Environmental Management program at the Idaho National Engineering and Environmental Laboratory is to use technology development to accelerate cleanup schedules and reduce costs. These new technologies will ensure completion of the primary goals. Innovative technologies continue to be developed to meet the Idaho National Engineering and Environmental Laboratory needs and will be demonstrated and implemented as necessary to meet schedules and budgets. Use of technologies such as advanced transuranic waste characterization systems will improve throughput and increase efficiency.

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the Detail Justification.

Significant Accomplishments and Program Shifts

- Completed first and second In-Situ Vitrification Planar Melts at Test Area North V-Tanks (FY 1998) and initiate Operable Unit 1-07B Stage 2 treatability study field demonstrations (FY 1999, Waste Area Group 1).
- Completed Operable Unit 1-10 Comprehensive Remedial Investigation/Feasibility Study and Proposed Plan (FY 1998, Waste Area Group 1) and Initiate Operable Unit 1-10 Remedial Design/Remedial Action activities (FY 1999, Waste Area Group 1).
- Completed Operable Unit 4-13 Remedial Investigation Baseline Risk Assessment (FY 1998) and complete Operable Unit 4-13 Comprehensive Record of Decision and Proposed Plan (FY 1999, Waste Area Group 4).
- Complete assessment of all Waste Area Group 4 release sites and facilities (FY 1999).
- Completed Operable Unit 5-12 Comprehensive Remedial Investigation/Feasibility Study (FY 1998) and draft Record of Decision and submit for regulatory review (FY 1999, Waste Area Group 5).
- Completed Operable Unit 10-04 Comprehensive Remedial Investigation/Feasibility Study (FY 1998). Implement Operable Unit 10-04 Remedial Investigation/Feasibility Study Work Plan field activities (FY 1999) (Waste Area Group 10).
- Completed deactivation of the ROVER Facility (FY 1998) and Old Waste Calcining Facility (FY 1999, OIM-110).
- Reduce security requirement by completing installation of Security System Alarm System at the Idaho Nuclear Technology and Engineering Center (FY 1998) and complete construction of security facility remodeling, security system operating and project turnover (FY 1999, OIM-105).
- Complete the deactivation design for the Nuclear Technology and Engineering Center Fuel Processing Complex (CPP-601), Hot Chemistry Laboratory (CPP-627), and Headend Processing Plant (CPP-640) (FY 1999, OIM-112).
- Completed Sitewide Electrical Distribution Systems Upgrade (FY 1998, OIM-107).

- Complete segments of the Electrical Utilities System Upgrade Project e.g.., replacement of electrical panels, correct overloaded circuits, and test the reliability of the system (FY 1999, OIM-106).
- Continued Storage Waste Examination Pilot Plant production examination operations, selective intrusive waste sampling and analysis, and head space gas sampling to characterize and certify transuranic waste for disposal at the Waste Isolation Pilot Plant near Carlsbad, New Mexico (FY 1998/FY 1999, ID-WM-103).
- Disposed of 34 m^3 of mixed low-level waste and 3,264 m^3 of low-level waste, and safely stored 1,714 m^3 of mixed low-level waste and 6,035 m^3 of low-level waste in compliance with environmental regulations and DOE Orders (FY 1998). Dispose of 50 m^3 of mixed low-level waste and 6,500 m^3 of low-level waste, and safely store 1,123 m^3 of mixed low-level waste and 2,000 m^3 of low-level waste in compliance with environmental regulations and DOE Orders (FY 1999, ID-WM-101).
- Characterize and validate 68 m^3 of non-mixed transuranic waste designated for disposal at the Waste Isolation Pilot Plant. Approximately 64,990 m^3 of transuranic waste will be safely stored at the Idaho National Engineering and Environmental Laboratory in compliance with environmental regulations and DOE Orders (FY 1999, ID-WM-103).
- Meet Idaho Settlement Agreement, Federal Facility Compliance Agreement, Federal Facility Agreement/Consent Order, and other regulatory requirements in a safe and environmentally acceptable manner (FY 2000).
- Comply with Federal Facilities Agreement/Consent Order schedules and milestones for the assessment and cleanup of Test Area North, Test Reactor Area, Idaho Nuclear Technology Engineering Center, Central Facilities Area, Power Burst Facility, Radioactive Waste Management Complex, and Pit 9 Remediation and for site-wide monitoring (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
ID-ER-101 / Test Area North Remediation	9,200	4,107	10,458	6,351	154.6%
ID-ER-104 / Central Facilities Area Remediation	1,768	871	2,038	1,167	134.0%
ID-ER-105 / Power Burst Facility/Auxiliary Reactor Area	1,241	871	2,213	1,342	154.1%
ID-LRP-101-PC / Environmental Engineering and Science Center	0	8,939	0	-8,939	-100.0%
ID-OIM-105 / Security Facilities Consolidation Project	864	840	0	-840	-100.0%
ID-OIM-106 / Electrical and Utility Systems Upgrade Project, Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant)	17,541	13,584	12,879	-705	-5.2%
ID-OIM-107 / Idaho National Engineering and Environmental Laboratory Electrical Distribution Upgrade	3,105	0	0	0	0.0%
ID-OIM-108 / Idaho National Engineering and Environmental Laboratory Road Rehabilitation	600	8,079	2,716	-5,363	-66.4%
ID-OIM-109 / Health Physics Instrument Laboratory	0	1,049	7,310	6,261	596.9%
ID-OIM-110 / Pre-FY 2007 Surplus Facility Deactivation Project	7,250	6,503	7,288	785	12.1%
ID-OIM-112 / Pre-FY 2007 Idaho National Engineering and Environmental Laboratory Surveillance and Maintenance	3,853	4,330	4,189	-141	-3.3%
ID-OIM-114 / Sitewide Idaho National Engineering and Environmental Laboratory Information Network	0	0	50	50	>999.9%
ID-OIM-115 / Site Operations Center	0	0	1,306	1,306	>999.9%
ID-WM-101 / Idaho National Engineering and Environmental Laboratory Low-Level Waste/Mixed Low-Level Waste/Other Waste Program	21,855	25,632	22,191	-3,441	-13.4%
ID-WM-103 / Idaho National Engineering and Environmental Transuranic Waste	36,398	33,764	36,323	2,559	7.6%
Total, Idaho	103,675	108,569	108,961	392	0.4%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Idaho National Engineering and Environmental Laboratory	103,675	108,569	108,961	392	0.4%
Total, Idaho	103,675	108,569	108,961	392	0.4%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	0.0	0.0	58.0
Cleanups	0.0	0.0	37.0
Facility Deactivation			
Deactivations	1.0	1.0	1.0
Transuranic Waste			
Storage (m^3)	65,000.0	64,990.0	63,975.0
Shipped to DOE Disposal Site (m^3)	0.0	10.0	1,015.0
Mixed Low-Level Waste			
Storage (m^3)	1,714.4	1,123.0	697.0
Treatment (m^3)	225.8	113.0	113.0
Disposed On-site/Commercial (m^3)	12.7	50.0	50.0
Shipped to DOE Disposal Site (m^3)	21.4	0.0	0.0
Low-Level Waste			
Storage (m^3)	6,035.0	2,000.0	3,385.0
Treatment (m^3)	3,690.4	5,200.0	1,464.0
Disposed On-Site/Commercial (m^3)	3,264.4	6,500.0	4,329.0
Shipped to DOE Disposal Site (m^3)	2.0	0.0	0.0

Site Description

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory, established as the National Reactor Testing Station in 1949, occupies 890 square miles in the Snake River Plain of Southeastern Idaho. Over the years, 52 reactors have been constructed and operated at the Idaho National Engineering and Environmental Laboratory. There are nine primary facilities at the Idaho National Engineering and Environmental Laboratory as well as administrative, engineering, and research laboratories in Idaho Falls, approximately 50 miles east of the site. Other activities at the Idaho National Engineering and Environmental Laboratory over the last five decades include nuclear technology research, defense programs, engineering testing and operations, as well as ongoing projects to develop, demonstrate, and transfer advanced engineering technology and systems to private industry. These activities have resulted in an inventory of high-level waste and an inventory and the continued generation of spent nuclear fuel, transuranic waste, mixed low-level waste, and low-level waste. Idaho National Engineering and Environmental Laboratory activities have also resulted in contaminated areas and potential release sites requiring remediation under the Comprehensive Environmental Response, Compensation, and Liability Act, and other environmental regulations. Finally discontinued activities at the Idaho National Engineering and Environmental Laboratory have left a number of surplus facilities. The deactivation program provides for the deactivation of these surplus facilities placing them in a safe, stable, low-cost condition, requiring minimal surveillance and maintenance.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Idaho site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Funding estimates are based on historic cost information and annual cost estimating guidance. For most projects, cost estimates were independently reviewed by the US Army Corps of Engineers, and a DOE and site management and operating contractor team.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-ER-101 / Test Area North Remediation (Waste Area Group 1)			
Waste Area Group 1 has 10 Operable Units, containing 94 potential release sites, listed in the Federal Facilities Agreement/Consent Order. Activities associated with Waste Area Group 1 are legally mandated by the Federal Facilities Agreement/Consent Order and the Comprehensive Environmental Response, Compensation, and Liability Act. Funding supports the completion of all cleanup activities associated with Waste Area Group 1 by FY 2006 and ensures implementation of the operable unit 1-07B groundwater cleanup action providing containment of the contaminant plume and active aquifer remediation.			
■ Operate Groundwater Test Facility for Operable Unit 1-07B Phase B Hot Spot Containment and removal; construct and operate Phase C Dissolved Phase Plume Treatment Units..			
■ Begin active remediation of non-radionuclide contaminated surface soil sites.			
■ Perform Operable Unit 1-07B Stage 2 treatability study field demonstrations for in-situ, chemical oxidation and natural attenuation.			
■ Implementation of field cleanup activities at the Water Research Reactor Test Facility diesel oil spill sites, grade and restrict access to several burn pits, and implement mercury spill cleanup.			
■ Submit Operable Unit 1-10 Draft Remedial Action Work Plan to DOE for review and approval.			
ID-ER-101	9,200	4,107	10,458

Metrics			
Remedial Action			
Assessments	0.0	0.0	24.0
Cleanups	0.0	0.0	13.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-ER-104 / Central Facilities Area Remediation (Waste Area Group 4)			
Waste Area Group 4 consists of 52 potential release sites which require assessment as stipulated by the Federal Facilities Agreement/Consent Order and the Comprehensive Environmental Response, Compensation, and Liability Act. A Record of Decision for Operable Unit 4-13, to be submitted in June 1999, will detail the final remedial actions which must be performed at the various release sites. Funding supports all regulatory requirements and completion of all remedial activities by 2003.			
■ Continue long-term groundwater and landfill soil monitoring at Operable Unit 4-12.			
■ Implement the Remedial Design/Remedial Action Work Plan for Operable Unit 4-13 including cleanup or removal of soil contamination sites including cesium-contaminated drainfields, lead-contaminated transformer storage yards, and radium-contaminated dry wells.			
■ Initiate Remedial Design/Remedial Action activities at 10 remaining release sites.			
ID-ER-104	1,768	871	2,038

Metrics			
Remedial Action			
Assessments	0.0	0.0	16.0
Cleanups	0.0	0.0	10.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-ER-105 / Power Burst Facility/Auxiliary Reactor Area (Waste Area Group 5)			
Waste Area Group 5 has 13 Operable Units listed in the Federal Facility Agreement/Consent Order. Activities associated with Waste Area Group 5 are legally required by the Federal Facilities Agreement/Consent Order and the Comprehensive Environmental Response, Compensation, and Liability Act. Operable Unit 5-12 consists of 4 sites and the comprehensive Remedial Investigation/Feasibility Study required to complete the Waste Area Group 5 cleanup. The Remedial Investigation/Feasibility Study recommendations support preparation of a Comprehensive Record of Decision for Operable Unit 5-12. The Operable Unit 5-12 Comprehensive Record of Decision is a Federal Facilities Agreement/Consent Order milestone due October 1999. Funding supports regulatory requirements and completion of all investigations and remedial actions by FY 2006.			
■ Prepare the Remedial Design Scope of Work for Operable Unit 5-12.			
■ Prepare and implement the Remedial Design/Remedial Action Work Plan for Operable Unit 5-12.			
ID-ER-105	1,241	871	2,213
Metrics			
Remedial Action			
Assessments	0.0	0.0	18.0
Cleanups	0.0	0.0	14.0
ID-LRP-101-PC			
Provides for activities under the Idaho Long-Range Plan, including complex-wide integration and systems engineering support.			
■ This activity is being funded in the Defense Science and Technology Development account in FY 2000.			
■ Consolidating this program allows for a comprehensive, complex-wide program for verifying and accelerating deployment of environmental cleanup technologies and furtherance of DOE's environmental stewardship mission.			
ID-LRP-101-PC	0	8,939	0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
No quantifiable corporate performance measures are associated with this project.			
ID-OIM-105 / Security Facilities Consolidation Project (95-D-456)			
This line-item construction project provides new facilities and equipment to support the Idaho Nuclear Technology and Engineering Center security organization.			
■ No activity, project completed. Included in the funding totals for this project baseline summary are $602,000 for FY 1998; and $485,000 for FY 1999 for the line item.			
ID-OIM-105	864	840	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
ID-OIM-106 / Electrical and Utility Systems Upgrade Project, Idaho Nuclear Technology and Engineering Center (96-D-464)			
This project is to upgrade the Idaho National Engineering and Environmental utility systems by correcting high risk life-safety, health, and environmental deficiencies. The work corrects safety deficiencies and will improve reliability and efficiency of electrical systems needed to support the site settlement agreement. This project was validated by DOE-Idaho and Power Engineers of Hailey, Idaho			
■ Complete construction of the Electrical Distribution System and Standby Power System.			
■ Continue replacement of electrical panels and service entrances in specific facilities to correct overloaded equipment, grounding problems, and code violations.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Complete testing on the Electrical Distribution System and Standby Power System.			
■ Continues funding for construction of the Electrical and Utility Systems Upgrade Project, 96-D-464. Included in the funding totals for this PBS are $14,985,000 for FY 1998; $11,544,000 for FY 1999; and $11,971,000 for FY 2000 for the line-item.			
ID-OIM-106	17,541	13,584	12,879

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-107 / Idaho National Engineering and Environmental Laboratory Electrical Distribution Upgrade (96-D-461)

This project provides for the planning, management, design, procurement, and construction activities to upgrade portions of the Idaho Engineering and Environmental Laboratory electrical distribution system which provides numerous users at the Idaho Engineering and Environmental Laboratory with reliable electrical power.

■ No activity planned; project complete. Included in the funding totals for this project baseline summary are $2,927,000 for FY 1998 for the line-item.			
ID-OIM-107	3,105	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-OIM-108 / Idaho National Engineering and Environmental Laboratory Road Rehabilitation (98-D-700)			
This project consists of the line item construction project to rehabilitate approximately 45 miles of the site road system and 27,000 square yards of parking area to provide safe transportation for waste movements, which are directly associated with regulatory and enforceable agreement compliance. The original cost estimate and scope was validated by a DOE and site management and operating contractor team, and competitively subcontracted.			
■ Project construction will continue with completion planned in FY 2001.			
■ Continues funding for construction of the Idaho National Engineering and Environmental Laboratory Road Rehabilitation, 98-D-700. Included in the funding totals for this PBS are $500,000 for FY 1998; $7,710,000 for FY 1999; and $2,590,000 for FY 2000 for the line item.			
ID-OIM-108	600	8,079	2,716

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-109 / Health Physics Instrument Laboratory (99-D-404)

The Health Physics Instrumentation Laboratory project is a line item construction project which provides for the design, procurement, and construction of the new facility in order to provide reliable and safe radioactive detection equipment for all programs at the Idaho National Engineering and Environmental Laboratory. Laboratory operations will include repair, calibration, dosimeter irradiation, and research and development required to support radiation detection equipment needs for the site. This new facility will replace an existing facility which is beyond its original design life and is significantly deteriorated. Original cost estimate and scope were validated by a DOE and site management and operating contractor team, and the construction phase will be competitively subcontracted.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Complete title design activities and initiate construction with completion planned in FY 2002.			
■ Continues funding for construction of the Health Physics Instrumentation Laboratory, 99-D-404. Included in the funding totals for this PBS are $0 for FY 1998; $950,000 for FY 1999; and $7,200,000 for FY 2000 for the line item.			
ID-OIM-109	0	1,049	7,310

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-110 / Pre-FY 2007 Surplus Facility Deactivation Project

This project provides for the deactivation of surplus facilities which reduces the cost and risk associated with surplus contaminated facilities. This includes removal of radioactive and hazardous materials, removal of uranium and other fissile materials, and isolation of the surplus facilities from ongoing operating and utility systems. The project supports compliance with Resource Conservation and Recovery Act and has been validated by the DOE.

- Increase deactivation activities at CPP-601, Security Training Facility.
- Completion of the title design for CPP-603 wet spent nuclear fuel deactivation project on schedule.

ID-OIM-110	7,250	6,503	7,288

Metrics			
Facilities Deactivation			
Deactivations	1.0	1.0	1.0

ID-OIM-112 / Pre-FY 2007 Idaho National Engineering and Environmental Laboratory Surveillance and Maintenance

This project provides surveillance and maintenance of radioactively contaminated surplus facilities to maintain in a condition reducing the risk to site personnel and the environment.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue surveillance and maintenance activities in CPP-601, CPP-640, CPP-627, CPP-621, and CPP-691 at a level consistent with the deactivation work.			
■ Start surveillance and maintenance in CPP-603.			
ID-OIM-112	3,853	4,330	4,189

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-114 / Sitewide Idaho National Engineering and Environmental Laboratory Information Network

The Sitewide Information Network Project will provide communication links between and among operating areas at the Idaho National Engineering and Environmental Laboratory, and provide connections to external networks.

■ Initiate project support activities for this new activity for FY 2000.

ID-OIM-114	0	0	50

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-115 / Site Operations Center

This project will potentially provide a new multi-purpose, multi-user facility that will house a cafeteria, conference rooms, bus depot, and office space. Worker health and safety issues are in jeopardy due to the current aging and deteriorating facilities, which may have to be closed. This activity is being done in anticipation of a FY 2001 line-item construction project. However, depending on conditions of the facilities, actions may need to be taken prior to FY 2001.

■ Identify a preferred path forward for the Central Facilities Area Site Operations Center.

ID-OIM-115 / Site Operations Center	0	0	1,306

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-WM-101 / Idaho National Engineering and Environmental Low-Level Waste/Mixed Low-Level Waste/Other Waste Program

The project provides for the daily management, treatment, storage and disposal of mixed low-level waste, low-level waste, hazardous waste, industrial waste cubing system, and special case waste for the Idaho National Engineering and Environmental Laboratory. This project enables DOE to comply with the Idaho National Engineering and Environmental Laboratory and other DOE Site Treatment Plans under the Federal Facility Compliance Act by providing incineration, stabilization, macroencapsulation, sizing/sorting/segregation, and lead cask dismantlement services for treatment of the Idaho National Engineering and Environmental Laboratory and other DOE Complex sites' mixed low-level waste at the Waste Reduction Operations Complex through FY 2003 and commercial treatment of the Idaho National Engineering and Environmental Laboratory mixed low-level waste between FY 2004 and FY 2006 using the Advanced Mixed Waste Treatment Project. This project also provides low-level waste volume reduction, where possible, through incineration, compaction, and size reduction at the Waste Reduction Operations Complex and disposal in the active pit of the Radioactive Waste Management Complex Subsurface Disposal Area. Other DOE Complex or commercial low-level waste disposal facilities will be utilized after FY 2006 for contact-handled low-level waste. This project also enables the Idaho National Engineering and Environmental Laboratory to comply with the Resource Conservation and Recovery Act treatment and disposal requirements for hazardous waste using commercial treatment, storage, and disposal facilities.

- Continue lead cask dismantlement at Test Area North.
- Continue mixed low-level waste incineration, stabilization, and sizing at the Waste Reduction Operations Complex.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue low-level waste volume reduction activities at the Waste Reduction Operations Complex.			
■ Continue contact handled and remote handled low-level waste disposal in the Radioactive Waste Management Complex Subsurface Disposal Area.			
■ Continue to operate and maintain one storage facility for hazardous waste.			
■ Continue off-site treatment and disposal of hazardous waste.			
■ Consolidated project control and reporting will be provided.			
ID-WM-101	21,855	25,632	22,191

Metrics			
Mixed Low-Level Waste			
Storage (m^3)	1,714.4	1,123.0	697.0
Treatment (m^3)			
Disposed On-site/Commercial (m^3)	225.8	113.0	113.0
Shipped to DOE Disposal Site (m^3)	12.7	50.0	50.0
Low-Level Waste	21.4	0.0	0.0
Storage (m^3)	6,035.0	2,000.0	3,385.0
Treatment (m^3)			
Disposed On-site/Commercial (m^3)	3,690.4	5,200.0	1,464.0
Shipped to DOE Disposal Site (m^3)	3,264.4	6,500.0	4,329.0
Hazardous Waste			
Disposed (MT)	65.0	65.0	65.0
Other Waste			
Disposed (m^3)	0.0	0.0	0.0

(dollars in thousands)

FY 1998	FY 1999	FY 2000

ID-WM-103 / Idaho National Engineering and Environmental Transuranic Waste

The mission of the Transuranic Waste program is to safely store, treat, and prepare for disposal approximately 65,000 m^3 of transuranic mixed waste located at the Idaho National Engineering and Environmental Laboratory Radioactive Waste Management Complex. Most of the waste was shipped from the Rocky Flats Plant for interim storage until disposal at a transuranic waste repository. The Radioactive Waste Management Complex operations include waste characterization and certification of transuranic waste to meet the Waste Isolation Pilot Plant waste acceptance criteria. This project is needed to meet the Idaho Settlement Agreement requirement to ship a minimum of 3,100 m^3 of transuranic waste out of the state by December 31, 2002. The remaining waste will be treated in the planned, privatized Advanced Mixed Waste Treatment Project to meet the Waste Isolation Pilot Plant Waste Acceptance Criteria or other appropriate disposal facility requirements before it is shipped for disposal. The Advanced Mixed Waste Treatment Project capital asset acquisition project (ID-WM-104) is discussed in the Defense EM Privatization account; and the Advanced Mixed Waste Treatment Project production operations project (ID-WM-105) is discussed in the Defense Post 2006 Completion account. All stored transuranic waste is planned to be removed from Idaho by December 31, 2015, but no later than December 31, 2018, as required by the Agreement.

- Ship 1,015.0 m^3 of transuranic waste to the Waste Isolation Pilot Plant for disposal.
- Safely store approximately 63,975 m^3 of transuranic mixed waste in compliance with environmental regulations and DOE orders.
- Provide transuranic waste characterization and certification-related support activities for disposal at Waste Isolation Pilot Plant by completing examination of at least 5,000 drums of transuranic waste at the Stored Waste Examination Pilot Plant.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide for compliance with the requirements in the Idaho Settlement Agreement for transuranic and transuranic mixed waste, such as safety analyses reports, transuranic database maintenance, and annual updates of the Resource Conservation and Recovery Act permits.			
ID-WM-103	36,398	33,764	36,323
Metrics			
Transuranic Waste			
Storage (m^3)	65,000.0	64,990.0	63,975.0
Disposed (m^3)	0.0	10.0	1,015.0
Total, Idaho	103,675	108,569	108,961

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
ID-ER-101 / Test Area North Remediation	
■ Funding increase required to construct and operate Operable Unit 1-07B Phase C Dissolved Phase Plume Treatment Units. Also, implementation of field cleanup activities at the Water Research Reactor Test Facility diesel oil spill sites, grade and restrict access to several burn pits, and implement mercury spill cleanup	6,351
ID-ER-104 / Central Facilities Area Remediation	
■ Increase in funding due to initiation of cleanup activities in support of Operable Unit 4-13 contaminated soil sites per Record of Decision; initiation of Remedial Design/Remedial Action activities at 10 remaining release sties	1,167
ID-ER-105 / Power Burst Facility/Auxiliary Reactor Area	
■ Increase in funding required to begin implementation of cleanup activities at Operable Unit 5-12 per Record of Decision	1,342
ID-LRP-101-PC / Environmental Engineering and Science Center	
■ Funding for this activity is requested in the Defense Science and Technology budget in FY 2000 to consolidate complex-wide program	-8,939

	FY 2000 vs. FY 1999 ($000)
ID-OIM-105 / Security Facilities Consolidation Project	
■ Decrease in funding due to project completion	-840
ID-OIM-106 / Electrical and Utility Systems Upgrade Project	
■ Decrease in funding consistent with project baseline funding profile and scope of work	-705
ID-OIM-108 / Idaho National Engineering and Environmental Laboratory Road Rehabilitation	
■ Decrease represents winding down of the project toward 2001 completion date	-5,363
ID-OIM-109 / Health Physics Instrument Laboratory	
■ Increase represents the transition from design to construction	6,261
ID-OIM-110 / Pre-FY 2007 Surplus Facility Deactivation Project	
■ Increase reflects completion of title design for CPP-603 and increased deactivation activities at CPP-601	785
ID-OIM-112 / Pre-FY 2007 Idaho National Engineering and Environmental Laboratory Surveillance and Maintenance	
■ Decrease reflects surveillance and maintenance requirements relative to progression of deactivation work	-141
ID-OIM-114 / Sitewide Idaho National Engineering and Environmental Laboratory Information Network	
■ Initiation of project support activities for new initiative in FY 2000	50
ID-OIM-115 / Site Operations Center	
■ Develop path forward in anticipation of FY 2001 line-item construction project (multi-purpose support facility) to replace aging and deteriorating facilities.	1,306
ID-WM-101 / Idaho National Engineering and Environmental Low-Level Waste/Mixed Low-Level Waste/Other Waste Program	
■ Decrease reflects one year deferral of funding for commercial macroencapsulation for mixed low-level waste; cessation of operation of the industrial waste cubing system; and a reduction of low-level waste Performance Assessment/Composite Analysis maintenance-related activities	-3,441

	FY 2000 vs. FY 1999 ($000)
ID-WM-103 / Idaho National Engineering and Environmental Transuranic Waste	
■ Increased funding will enable the Idaho National Engineering and Environmental Laboratory to successfully meet the Idaho Settlement Agreement milestone to ship 3,100 cubic meters of transuranic waste out of Idaho by December 31, 2002. Includes upgrading Real-Time Radiography System to maintain examination throughput rates; utility and drainage upgrades to Resource Conservation and Recovery Act storage modules; and building a second Transuranic Package Transporter loading facility to support current shipping schedules of transuranic waste to the Waste Isolation Pilot Plant	2,559
Total Funding Change, Idaho	392

Oakland

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management (EM) Site/Project Completion program managed through the Oakland Operations Office, is to plan and implement remediation and waste treatment, storage, and disposal activities at three sites, two in California and one in New York. The sites are the Lawrence Livermore National Laboratory, consisting of the Livermore Site and Site 300, and the Separations Process Research Unit at the Knolls Atomic Power Laboratory in Schenectady, New York. Other DOE programs such as Defense Programs, Science, and Nuclear Energy Naval Reactor Program continue to have operating facilities at these sites. Also, the Oakland Operations Office is responsible for the administration of State and educational grants funded by this appropriation.

Program Goal

EM programmatic goals are to have cleanup completed at the Lawrence Livermore National Laboratory site by 2006, and at the recently identified Separations Process Research Unit site by 2014, and to ensure operating facilities and contaminated sites pose no undue risk to the public, worker health and safety, maintain compliance with applicable environmental laws, and manage risks associated with current and prior DOE operations.

Program Objectives

The program objective is to assess, remediate, decontaminate and decommission contaminated sites and facilities; characterize, treat, minimize, store, and dispose of hazardous and radioactive waste; develop demonstrate, test and evaluate new cleanup technologies. These program activities are conducted taking an integrated approach to assessing work and meeting schedules, while balancing risk, mortgage reduction, compliance, cost efficiencies, stakeholder input and implementation of enhanced performance mechanisms. Financial responsibility for newly generated waste will be returned to the generating DOE program by FY 2003. The Lawrence Livermore National Laboratory will be cleaned up and all legacy waste will be characterized and shipped off-site by FY 2006. Long-term surveillance and maintenance of implemented remedial actions (e.g., pump and treat facilities) will be assumed by the landlord programs post FY 2006. The Separations Process Research Unit will be cleaned up and all legacy wastes will be characterized and shipped off-site by FY 2014.

The Oakland Operations Office has identified several innovative technologies to be evaluated and used at the Lawrence Livermore National Laboratory. For example, field demonstrations using innovative technologies, in situ hydrous pyrolysis, Electrical Resistance Tomography, and biofiltration began in

FY 1998 at the Lawrence Livermore National Laboratory main site. Another innovative approach being considered is the Engineered Plume Collapse strategy which will demonstrate a system of these and other technologies to remove organic contaminants from ground water more rapidly than baseline conventional pump and treat approach. The current Interim Record of Decision for Building 834 at Lawrence Livermore National Laboratory Site 300 specifies an evaluation of various technologies for remediation of trichloroethylene plume and dense non-aqueous phase liquid sources. To date, surfactant testing has been completed and analyses are ongoing. At the Lawrence Livermore National Laboratory main site the Expedited Technology Demonstration Project was implemented in FY 1998 using a molten salt treatment methodology.

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the detail justification.

Significant Accomplishments and Program Shifts

- At the Livermore Main Site, continued operation of 4 permanent treatment facilities and 8 portable treatment units; began operation of portable treatment units at three new locations Treatment Facility D-East, Treatment Facility D-Southeast, and treatment facility-Building 518; and started Phase I in-site groundwater treatment facility at Trailer 5475 (FY 1998).
- Continue maintenance and operation of treatment facility and portable treatment units; install a soil vapor extraction treatment facility at TR 5475; start Phase II of groundwater in situ system at TR 5475; and complete one release site at the Livermore Main Site (FY 1999).
- Continue environmental restoration activities, i.e. groundwater monitoring and treatment system operation for containment and contaminant source removal and implementation of other cleanup actions, to ensure compliance with Federal Facility Agreements at both of the Lawrence Livermore National Laboratory sites (FY 2000).
- Completed and submitted Remedial Design Report #4 for Trailer 5475 and East Taxi Strip at Livermore Site and completed 6 release sites at the Livermore Main Site (FY 1998).
- Prepare closure documentation for Buildings 514 and 612 at the Livermore Main Site (FY 1999).
- Completed closure and cap construction of Pit 6 Operable Unit at the Lawrence Livermore National Laboratory Site 300 (FY 1998).
- Complete a Site-Wide Feasibility Study for the Lawrence Livermore National Laboratory Site 300 and complete 4 release sites (FY 1999).
- Completed Site 300 Building 815/Operable Unit 4 Final Action Memorandum and completed 7 release sites at Site 300 (FY 1998).

- Begin interim action groundwater treatment system at Building 815/Operable Unit 4 and treatability study for contaminant removal at Building 854/Operable Unit 6 at Site 300 (FY 1999).
- At the Livermore Main Site, completed construction of Decontamination and Waste Treatment Facility Phases 4 and 3A and started construction on Phase 3B (FY 1998) and continue construction of Phase 3B and start construction of Phase 5 (FY 1999).
- Activate and begin operational testing of the Decontamination and Waste Treatment Facility at the Lawrence Livermore National Laboratory Main Site (FY 2000).
- Completed construction on the Explosive Waste Treatment Facility at Site 300 (FY 1998) and begin operations (FY 1999).
- Initiated the testing of the effectiveness of Molten Salt Oxidation on mixed waste at the Livermore Site (FY 1998).
- Complete testing activities of Molten Salt Oxidation at Livermore site (FY 1999).
- Treated approximately 50,000 gallons of aqueous mixed low-level waste and 27,000 gallons of low-level waste, disposal of 778 cubic meters of low-level waste, 209 cubic meters of mixed low-level waste, and 4,666 cubic meters of hazardous waste (FY 1998).
- Manage over 1,800 cubic meters of newly generated solid waste; treat about 32,000 gallons of aqueous mixed low-level waste/low-level waste and dispose of approximately 573 cubic meters of low-level waste at the Nevada Test Site and over 149 cubic meters mixed low-level waste at a commercial treatment, storage, and disposal facility (FY 1999).
- Build an overhead crane in the high activity waste storage area at the Livermore Site (FY 1999).
- Issue an Environmental Assessment or Categorical Exclusion for the Large Container Processing Unit to meet National Environmental Protection Act requirements at the Livermore Site (FY 1999).
- Initiate surveillance and maintenance responsibility for the Separations Process Research Unit facilities (FY 2000).
- Continue storage, treatment, and some offsite disposal of waste(low-level, mixed low-level, and transuranic waste) at Lawrence Livermore National Laboratory (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OAK-001 / Lawrence Livermore National Laboratory Main Site Remediation	12,299	11,475	10,500	-975	-8.5%
OK-002 / Lawrence Livermore National Laboratory Site 300 Remedial Action	9,255	9,843	11,800	1,957	19.9%
OK-021 / Lawrence Livermore National Laboratory Base Program	19,778	21,434	21,891	457	2.1%
OK-026 / Lawrence Livermore National Laboratory General Plant Projects	375	395	1,700	1,305	330.4%
OK-027 / Lawrence Livermore National Laboratory Decontamination and Waste Treatment Facility	11,250	4,752	2,000	-2,752	-57.9%
OK-040 / State Grants	2,192	2,700	800	-1,900	-70.4%
OAK-041 / Accelerated Waste Treatment	1,253	1,315	2,000	685	52.1%
OAK-SPRU / Separations Process Research Unit	0	0	500	500	>999.9%
Total, Oakland	56,402	51,914	51,191	-723	-1.4%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Lawrence Livermore National Laboratory (CA)	54,210	49,214	49,891	677	1.4%
Separations Process Research Unit (NY)	0	0	500	500	>999.9%
Oakland Operations Office (CA)	2,192	2,700	800	-1,900	-70.4%
Total, Oakland	56,402	51,914	51,191	-723	-1.4%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Cleanups	13.0	5.0	7.0
Transuranic Waste			
Storage (m^3)	292.0	300.0	300.0
Mixed Low-Level Waste			
Storage (m^3)	599.0	550.0	550.0
Treatment (m^3)	196.0	149.0	149.0
Disposed On-site/Commercial (m^3)	209.0	149.0	149.0
Low Level Waste			
Storage (m^3)	1,618.0	1,655.0	1,655.0
Treatment (m^3)	101.0	43.0	43.0
Shipped to DOE Disposal Site (m^3)	778.0	573.0	573.0
Hazardous Waste			
Disposal On-site/Commercial (MT)	4,666.0	2,859.0	2,859.0

Site Description

Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory is a multi-disciplinary research laboratory specializing in weapons research and development which has two geographic locations in northern California. The Livermore Site is approximately one square mile and is located 40 miles east of San Francisco, near the City of Livermore. Site 300 is comprised of about 11 square miles and is located 15 miles southeast of the Livermore Site. Both the Livermore Site and Site 300 are on the Environmental Protection Agency's National Priorities List. Environmental Restoration activities at the Lawrence Livermore National Laboratory are focused on identifying contaminated ground water and soil from past operations and implementing appropriate cleanup actions. The environmental restoration activities at the Lawrence Livermore National Laboratory are divided into nine Operable Units, 1 at the Livermore Site, 8 at Site 300, and a total of 193 release sites. As of FY 2000, 139 release sites for the Livermore Site and Site 300 will be completed. Waste management activities are directed at compliant storage, treatment and off-site shipment for disposal of both legacy and currently generated hazardous and radioactive waste. In addition, characterization of a large portion of the legacy transuranic waste inventory is dependent on the completion of the Large Container Packaging Unit in FY 2001. Completion of the Decontamination and Waste Treatment Facility in FY 2000 will provide new, centralized, and integrated facilities for the treatment of all Lawrence Livermore National Laboratory waste.

Separations Process Research Unit

The Separations Process Research Unit located in Schenectady, New York has inactive facilities that require decontamination and decommissioning. To date no decontamination and decommissioning has been performed and the facilities have been placed in safe shutdown with the Nuclear Energy Naval Reactor Program maintaining landlord responsibilities. Beginning in FY 2000 the surveillance and maintenance of these facilities will be the responsibility of the EM program. In addition to the surveillance and maintenance, basic health and safety effort (radiation safety, industrial hygiene, industrial and nuclear safety) will be developed and implemented. Completion of the decontamination and decommissioning is planned for FY 2014.

Oakland Operations Office

Based on an Oakland Operations Office and State development statement of work, Oakland Operations Office awards and manages grants provided to the State for oversight activities which include, participation in scoping meetings, review of documents, and involvement with the public. Also, the Oakland Operations Office provides funds and grants to support various activities, such as tribal colleges and universities, center for environmental excellence, independent reviews and Hispanic scholarships.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Lawrence Livermore National Laboratory Livermore Site and Site 300 are managed through a performance based contract with the University of California to assure the most cost-effective services to the Government. The scope planned for cleanup activities in FY 2000 have been reviewed and are appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. These activities have had an independent cost review of the scope by the Corps of Engineers and the funds requested for FY 2000 are appropriate to perform the activities based on a historical level of effort costs.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OAK-001 / Lawrence Livermore National Laboratory Main Site Remediation			
The mission of this project is to identify existing contamination from past operations, control contaminated groundwater migration, and effectively remediate soil and groundwater where contaminants exceed regulatory limits at the Livermore Site. This project consists of one operable unit and 120 release sites.			
■ Continue operation and maintenance of treatment facilities; site monitoring and sampling requirements; risk analysis; and regulatory reporting to meet Record of Decision Federal Facility Agreement requirements.			
■ Complete expansion at Treatment Facility B (one well hookup); initiate Phase 3 in situ groundwater treatment at TR 5475; install a miniportable treatment unit at Treatment Facility E-Southwest; and at Treatment Facility East-Southeast, and a solar powered water treatment systems at Treatment Facility 518 North Facility A-East.			
■ Complete two release sites.			
OAK-001	12,299	11,475	10,500
Metrics			
Remedial Action/Release Site Cleanups	6.0	1.0	2.0
OK-002 / Lawrence Livermore National Laboratory Site 300 Remedial Action			
This project's mission is to identify existing contamination from past operations, control contaminated groundwater migration, and effectively remediate soil and groundwater where contaminants exceed regulatory limits at Site 300. This project consists of eight operable units and 73 release sites.			
■ Continue operation and maintenance of treatment facilities; site monitoring and sampling requirements; risk analysis; and regulatory reporting to meet Federal Facility Agreement requirements.			
■ Complete Site 300 Site-Wide Draft Record of Decision and submit to regulators.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete installation of portable treatment units, nitrate/perchlorate treatment systems and expand well fields at Building 815.			
■ Continue pilot treatment systems at Building 832 and characterization investigation field work at Building 812, Building 865, and Sandia Test Area.			
■ Install Off-site treatment system at Eastern General Services Area to accelerate plume collapse.			
■ Complete five release sites.			
OK-002	9,255	9,843	11,800
Metrics			
Remedial Action/Release Site Cleanups	7.0	4.0	5.0

OK-021 / Lawrence Livermore National Laboratory Base Program

The mission of this project is to formulate a centralized waste management program at Lawrence Livermore National Laboratory to ensure waste handling practices from the generating source through final disposition are consistent to ensure safe and compliant operations at the treatment, storage and disposal facilities. Waste types managed under this project include low-level waste, mixed low-level waste, transuranic waste, mixed transuranic waste and hazardous waste which includes treatment and disposal at commercial facilities.

- Review new procedures and processes associated with the activation and operation of the Decontamination and Waste Treatment Facility.
- Prepare safety and closure documentation for the obsolete Treatment, Storage, and Disposal Facilities.
- Plan, coordinate, and execute movement of materials, equipment, systems, and staff to the Decontamination and Waste Treatment Facility.
- Activate and operate (start up testing) the Decontamination and Waste Treatment Facility.

OK-021	19,778	21,434	21,891

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Transuranic Waste			
Storage (m^3)	292.0	300.0	300.0
Mixed Low-Level Waste			
Storage (m^3)	599.0	550.0	550.0
Treatment (m^3)	196.0	149.0	149.0
Disposed On-site/Commercial (m^3)	209.0	149.0	149.0
Low Level Waste			
Storage (m^3)	1,618.0	1,655.0	1,655.0
Treatment (m^3)	101.0	43.0	43.0
Shipped to DOE Disposal Site (m^3)	778.0	573.0	573.0
Hazardous Waste			
Disposed On-site/Commercial (m^3)	4,666.0	2,859.0	2,859.0

OK-026 / Lawrence Livermore National Laboratory General Plant Projects

The mission of the General Plant Projects is to support waste management operations by providing small capital improvements to property, purchase new/improved technology equipment, perform coded compliance updates, and/or upgrade existing buildings and utilities to meet current or new regulations and requirements.

- Procure long-lead equipment items such as air handling units.

OK-026	375	395	1,700

Metrics
No quantifiable corporate performance measures are associated with this project.

OK-027 / Lawrence Livermore National Laboratory Decontamination and Waste Treatment Facility (86-D-103)

The construction of the Decontamination and Waste Treatment Facility at the Lawrence Livermore National Laboratory is to provide new, centralized and integrated facilities for the hazardous waste management operations that will meet the requirement for a Low Hazard (chemical) Category 3 (nuclear) Facility.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Complete the activation of the Decontamination and Waste Treatment Facility ■ Continues funding and construction of the Decontamination and Waste Treatment Facility construction line item 86-D-103. Included in the funding totals for this program baseline summary are $11,250 for FY 1998, $4,752 (prior year funds used as an offset for FY 1999 uncosted reduction) for FY 1999, and $2,000 for FY 2000 for the line item.			
OK-027	11,250	4,752	2,000

Metrics
No quantifiable corporate performance measures are associated with this project.

OK-040-D / State Grants

The purpose of the project is to provide funding to support grants for State regulatory agencies who have oversight of the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act programs for DOE. A Memorandum of Agreement between the Department and Indian Nations allows for grants to support tribal universities and colleges.

- State agencies participate in meetings, review and comment on documents, and concur on environmental restoration actions.
- Provide funds to support activities related to tribal colleges and universities, center for environmental excellence, independent review and Hispanic scholarships.

OK-040	2,192	2,700	800

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OAK-041 / Accelerated Waste Treatment			
There are two subprojects associated with the mission of this project to accelerate waste treatment. The first subproject completed in FY 1998 is the Expedited Technology Demonstration Project which includes the demonstration of the Molten Salt Oxidation technology. The second subproject is the Large Container Processing Unit which will be used to resize the waste stored in oversize containers to a manageable size for shipment to the Waste Isolation Pilot Plant.			
■ Prepare and obtain approval of the Environmental Assessment and Resource Conservation and Recovery Act permits.			
■ Prepare the Preliminary Safety Analysis Report for the Large Container Processing Unit.			
■ Issue a Request for Proposal for a Contractor to design and build the Large Container Processing Unit.			
OAK-041	1,253	1,315	2,000
Metrics No quantifiable corporate performance measures are associated with this project.			
OAK-SPRU / Separations Process Research Unit			
The mission of this project is to remove radiological and hazardous contamination from the Separations Process Research Unit. Approximately 26 release site are to be decontaminated and decommissioned.			
■ First year of funding for surveillance and maintenance of these facilities in anticipation of decontamination and decommissioning.			
OAK-SPRU	0	0	500
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Oakland	56,402	51,914	51,191

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OAK-001 / Lawrence Livermore National Laboratory Main Site Remediation	
■ Decrease in funding request is due to reduced costs of treatment facility installation and build-outs and near-term completion of ROD commitments to control contaminant plume migration	-975
OK-002 / Lawrence Livermore National Laboratory Site 300 Remedial Action	
■ Increase in costs are for the finalization of the site-wide ROD, implementation of interim actions, development and implementation of a remedial design and construction schedule that will install source control remedies at all the Operable Units, application of destructive removal technologies such as hydrous pyrolysis, electro-kinetics and in situ chemical injection of oxidation reactants, and completion of source investigations	1,957
OK-021 / Lawrence Livermore National Laboratory Base Program	
■ Slight increase in funding to ensure safe and compliant operations for treatment, storage and disposal of wastes at the Lawrence Livermore National Laboratory	457
OK-026 / Lawrence Livermore National Laboratory General Plant Projects	
■ Increase in cost to procure long-lead equipment items with varied costs such as air handling units	1,305
OK-027 / Lawrence Livermore National Laboratory Decontamination and Waste Treatment Facility	
■ Decrease in costs consistent with Decontamination and Waste Treatment Facility (construction project for processing transuranic waste, mixed low-level waste, low-level waste, hazardous waste, and other waste) nearing completion at the Lawrence Livermore National Laboratory	-2,752
OK-040-D / State Grants	
■ Activities will continue but will be funded at a reduced level. However, similar activities are being funded in the Non-Defense Environmental Management appropriation	-1,900

	FY 2000 vs. FY 1999 ($000)
OAK 041 / Accelerated Waste Treatment	
■ Increase in cost for preparation and obtaining an Environmental Assessment and Resource Conservation and Recovery Act permits preparing the preliminary Safety Analysis Report and to issue a Request for Procurement for a contractor to design and build the large container processing units	685
OAK-SPRU / Separations Process Research Unit	
■ First year of funding requested for EM to assume surveillance and maintenance responsibility of Separation Process Research Unit facilities to be decontamination and decommissioning	500
Total, Oakland	-723

Richland

Mission Supporting Goals and Objectives

Mission

The Richland Operations Office manages the Department of Energy's Hanford Site in Southeast Washington State. The site mission under the Defense Environmental Management, Site/Project Completion account is to safely store and stabilize inventories of spent nuclear fuel and special nuclear materials. Included in this mission is deactivation of the nuclear facilities associated with these materials in order to reduce the risks posed by aging facilities and reduce the high annual costs for maintaining such facilities.

Program Goal

The Hanford Site will address the urgent risks associated with stored Spent Nuclear Fuel in close proximity to the Columbia River, plutonium and other nuclear material inventories requiring stabilization, and the deactivation of the associated nuclear facilities that exist to maintain these inventories.

Under the Spent Nuclear Fuel Project, by 2006 the entire inventory of 2,100 metric tons of degrading spent nuclear fuel will be removed from the K-Reactor storage basins, and stored in a dry storage configuration in the Canister Storage Building. Schedules and milestones related to stabilizing the spent nuclear fuel are commitments in the Hanford Federal Facility Agreement and Consent Order, commonly referred to as the "Tri-Party Agreement" and the Defense Nuclear Facilities Safety Board Recommendation 94-1 Implementation Plan. Deactivation of the K-East and K-West fuel storage basins would occur after fuel removal. The spent nuclear fuel would remain in dry storage awaiting final disposition, which is currently thought to be the geologic repository.

Also, by 2006 the entire inventory of about 4 metric tons of plutonium at the Plutonium Finishing Plant will be stabilized and placed in a safe interim storage configuration. Schedules and milestones related to stabilizing plutonium bearing materials at the Plutonium Finishing Plant are commitments in the Defense Nuclear Facilities Safety Board Recommendation 94-1 Implementation Plan. After stabilization, the goal of removing the safe stored material to an off-site location as soon as possible will be pursued. In conjunction with the stabilization activities at the Plutonium Finishing Plant, deactivation of the facility will occur as sections of the plant are no longer needed for stabilization.

Deactivation of other former defense nuclear facilities that fall under the Facility Transition Program will be accomplished. Deactivation of these facilities provides risk reduction benefits as well as outyear cost avoidances. Significant deactivation completions already accomplished are the Plutonium-Uranium Extraction facility that reduced the annual surveillance and maintenance costs from about $34 million to

less than $1 million a year, the B-Plant which reduced the annual surveillance and maintenance costs from about $19 million to less than $1 million per year, and the N-Reactor. The deactivation of facilities in the 300 Area, such as Buildings 324 and 327, which contain upwards of 1.5 million curies of dispersable radioactive material, will provide significant outyear savings in surveillance and maintenance costs. In addition to deactivation of these surplus facilities, some will be considered for economic transition to the private sector. With significant experience in nuclear facility deactivation, Richland provides lessons-learned and support to other facilities on-site as well as complex wide.

Program Objectives

In FY 2000, the Spent Nuclear Fuel project will make significant progress in preparations for the commencement of spent fuel removal from the K-East and K-West basins. Specifically the K-West system for removing fuel from the basin will be installed and tested in support of commencing fuel removal in early FY 2001. For K-East basin, the fuel retrieval system installation will begin to support a fuel retrieval start date in FY 2002. While awaiting fuel removal, the safe and contained storage of the spent nuclear fuel in the K-Basins is a primary objective achieved through the surveillance and maintenance of the facilities necessary to comply with the facility safety requirements.

At the Plutonium Finishing Plant, significant progress toward stabilization of plutonium bearing materials will be made in FY 2000. Specifically, stabilization of up to 600 kilograms of plutonium residues are expected, 160 liters of plutonium bearing solutions will be stabilized, and about 238 containers of plutonium metals and oxides will be stabilized. While stabilization activities proceed, the safe and secure storage of the special nuclear material in the Plutonium Finishing Plant is a primary objective. It will be achieved through surveillance and maintenance of the Plutonium Finishing Plant necessary to comply with the facility safety requirements and safeguards requirements. Safeguards requirements include obligations to comply with International Atomic Energy Agency non-proliferation inspections.

Planning for the deactivation and transition of facilities that fall under the Facility Transition Program will be accomplished. Specifically, this will include buildings mostly in the 300 area - such as Buildings 324 and 327. While these facilities await deactivation and transition, the safe and secure maintenance of the facilities will be achieved through surveillance and maintenance of the facilities necessary to comply with the facility safety requirements and safeguards requirements.

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the Detail Justification.

Significant Accomplishments and Program Shifts

- Completed N-Reactor deactivation (FY 1998).

- Completed negotiation of spent nuclear fuel Tri-Party Agreement milestones and resolved dispute resolution (FY 1998).
- Completed construction of the Spent Nuclear Fuel canister storage building superstructure (FY 1998).
- Completed manufacture of the Spent Nuclear Fuel stabilization equipment prototype (FY 1998)
- Completed Spent Nuclear Fuel Project baseline validation (FY 1998).
- Completed B-Plant deactivation (FY 1998)
- Restarted limited plutonium operations at the Plutonium Finishing Plant (FY 1998).
- Completed size reduction and shipment of Building 324 B-Cell rack 1B and low-level waste to the Hanford burial grounds per Tri-Party Agreement requirements (FY 1998).
- Completed resolution of Building 324 fire hazard concerns (FY 1998).
- Completed final Building 324/327 Stabilization/Deactivation Project Plan per Tri-Party Agreement Milestone (FY 1998).
- Transferred 236 legacy waste buckets stored in Building 327 hot-cells to the Hanford burial grounds (FY 1998).
- Completed transfer of all Building 324 cesium inventory to the Waste Encapsulation and Storage Facility in the Central Hanford 200 Area for interim storage (FY 1998).
- Complete Spent Nuclear Fuel stabilization facility pre-operational acceptance test (FY 1999).
- Complete Spent Nuclear Fuel project safety designs (FY 1999).
- Restart plutonium stabilization activities at the Plutonium Finishing Plant (FY 1999).
- Complete cold installation for the vertical denitration calciner and commence prototype vertical denitration calciner stabilization operations at the Plutonium Finishing Plant (FY 1999).
- Complete installation of three additional plutonium stabilization furnaces at the Plutonium Finishing Plant (FY 1999).
- Complete design and initiate procurement of automated Plutonium stabilization and packaging system (FY 1999).
- Complete size reduction and shipment of Building 324 B-Cell racks 1A and 2A and low-level waste to the Hanford burial grounds per Tri-Party Agreement requirements (FY 1999).
- Complete fuel retrieval, drying, transport and storage system testing to support commencement of fuel removal from the K-West basin in early FY 2001 (FY 2000).
- Complete K-East modification and begin K-East Fuel Retrieval System installation in preparation for K-East basin fuel removal in FY 2002 (FY 2000).
- Continue stabilization of 160 liters of plutonium bearing solutions, and about 238 containers of plutonium metals and oxides (FY 2000)

- Commence stabilization of about 600 kilograms of plutonium bearing residues and plutonium bearing polycube materials (FY 2000).
- Continue surveillance and maintenance of spent nuclear fuel facilities and all facilities and material that fall under the Facility Transition Program (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
RL-ER09 / N Reactor Deactivation	15,772	0	0	0	0.0%
RL-TP01 / B-Plant Sub-Project	20,460	2,716	0	-2,716	-100.0%
RL-TP03 / Plutonium-Uranium Extraction Sub-Project	-67	0	0	0	0.0%
RL-TP04 / 300 Area/Special Nuclear Materials Sub-Project	3,677	4,444	3,658	-786	-17.7%
RL-TP05 / Plutonium Finishing Plant Deactivation	57,724	104,136	136,197	32,061	30.8%
RL-TP08 / 324/327 Facility Transition Project	21,068	31,547	27,908	-3,639	-11.5%
RL-TP10 / Accelerated Deactivation	2,114	1,738	1,741	3	0.2%
RL-TP12 / Transition Project Management	10,776	15,148	15,191	43	0.3%
RL-TP14 / Surplus Facility 300 Area Revitalization	735	508	646	138	27.2%
RL-WM01 / Spent Nuclear Fuels Project	152,887	170,400	190,955	20,555	12.1%
Total, Richland	285,146	330,637	376,296	45,659	13.8%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Hanford	285,146	330,637	376,296	45,659	13.8%
Total, Richland	285,146	330,637	376,296	45,659	13.8%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Facility Deactivation			
Buildings Deactivated During Period	26.0	0.0	16.0
Buildings in Post-Deactivation Monitoring	28.0	5.0	21.0
Buildings Not Yet Deactivated/Monitored	0.0	165.0	149.0
Nuclear Material			
Stabilized - Pu Residue (kg)	0.0	0.0	600.0
Stabilized - U in Other Forms (kg)	0.0	78.0	9.0
Stabilized - Pu Solution	0.0	40.0	160.0
Stabilized - Pu Metal/Oxides/Other	0.0	238.0	238.0
Spent Nuclear Fuel			
In Stabilization Process (Not Stabilized) (MTHM)	2,105.7	2,100.6	2,100.6
In Stabilization Process (Not Stabilized) (m^3)	276.4	275.0	276.0

Site Description

Hanford

The United States Department of Energy's Richland Operations Office manages the Department's Hanford Site, in Southeastern Washington State. The 1,465 square kilometer (560 square mile) site is bounded on the north by over 50 miles of the Columbia River, and to the south by Rattlesnake Ridge. The flat plateau containing the Hanford site is the only section of the mid-Columbia River that is not confined by gorges, and is known as the Hanford Reach. The Department leases some of Hanford's land to the State of Washington which in turn leases it to the US Ecology and the Washington Public Power Supply System.

Hanford was established in secrecy during World War II to produce plutonium for the nation's nuclear weapons. Peak production years were reached in the 1960s when 9 production reactors were in operation along the river. The last to be decommissioned was N-Reactor and its fuel in the K-Basins is now being relocated to higher ground in the central plateau, known as the 200-Area. The 200-Area had been the site of major nuclear chemical processing plants which were all shut down by the early 1990s. The 200-Area is now the core of major waste management operations; and includes 177 underground storage tanks containing the high-level waste from past processing operations. A major effort to immobilize these wastes by vitrification is underway by a privatization contractor. The Plutonium Finishing Plant is one of the last production facilities that will remain operational -- to process remaining plutonium materials. Other areas of the site include the Fast Flux Test Facility (400-Area) which does not currently have a mission (currently budgeted and managed by the Office of Nuclear Energy); research and development activities by Pacific Northwest National Laboratories in the

300-Area, and support facilities in the 1100-Area, most of which have been turned over to the local communities

The Hanford mission is now site cleanup and environmental restoration, including the groundwater/vadose zone integration project to protect the Columbia River. The cleanup is covered by a 1989 consent agreement between the Department of Energy, the Environmental Protection Agency, and the Washington State Department of Ecology. This Tri-Party Agreement contains enforceable milestones for bringing Hanford into compliance with the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act. Most of the Hanford budget is directed at compliance with these milestones. Additionally, the Defense Nuclear Facilities Safety Board takes great interest in safety at Hanford and has issued recommendations which are the basis for the Defense Nuclear Facilities Safety Board commitments that are also high priority budget items.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope Planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Nearly 100 percent of the projects' funding included in this section of the budget had an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities based on estimated project progress and accumulated cost management success.			
RL-ER09 / N Reactor Deactivation			
This project involved the deactivation of 88 facilities; cleanout and stabilization of the N Basin; cleanout and stabilization of the Emergency Dump Basin; removal of fuel spacers from silos; operation of the N Reactor waste pool; and surveillance and maintenance.			
■ Project completed in FY 1998. No further activity.			
RL-ER09	15,772	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

RL-TP01 / B-Plant Sub-Project

This project deactivated and maintained B Plant and its ancillary facilities in a safe and cost-effective surveillance and maintenance status through FY 1998. It will be turned over to the Environmental Restoration project during FY 1999.

- B-Plant deactivation completed in FY 1998. B-Plant closeout activities and punch-list items are completed in FY 1999. No further activity in FY 2000.
- This project included $2,400,000 in FY 1998 for line-item 97-D-451, B-Plant Safety Class Ventilation Upgrade.

RL-TP01	20,460	2,716	0

Metrics			
Facility Deactivation			
Buildings Deactivated During Period	26.0	0.0	0.0
Buildings in Post Deactivation Monitoring	28.0	0.0	0.0

RL-TP03 / Plutonium-Uranium Extraction Facility Sub-Project

This project deactivated and maintained the Plutonium-Uranium Extraction and its ancillary facilities in a safe and cost-effective surveillance through FY 1997, at which time the project was transitioned to Long-Term Surveillance and Maintenance project, RL-ER05.

- Project completed in FY 1997. No further activity. Negative Budget Authority in FY 1998 represents deobligation of prior year carryover funds for transfer to other activities within this budget.

RL-TP03	-67	0	0

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-TP04 / 300 Area/Special Nuclear Materials Sub-Project			
This project's main objective is to complete deactivation and closure of the 300 Area Fuel Supply Shutdown complex. It includes regulatory compliant surveillance and maintenance of 1200 metric tons of special nuclear material until it is dispositioned; isolating Building 313; closure of two remaining Resource Conservation and Recovery Act permitted treatment, storage, disposal systems; complete deactivation and stabilization activities of the systems/buildings in the Fuel Supply Shutdown complex; and disposition of the remaining low enriched spent nuclear fuel.			
■ Continue surveillance and maintenance activities for maintaining facility safety bases.			
RL-TP04	3,677	4,444	3,658
Metrics			
Facility Deactivation			
Buildings Deactivated During Period	0.0	0.0	16.0
Buildings in Post Deactivation Monitoring	0.0	2.0	18.0
Buildings Not Yet Deactivated/Monitored	0.0	16.0	0.0

RL-TP05 / Plutonium Finishing Plant Deactivation

Provides for safe and secure storage of special nuclear materials at the Plutonium Finishing Plant complex, and provides the basic infrastructure on which nuclear material stabilization and facility deactivation are dependent. Implements the Defense Nuclear Facility Safety Board Recommendation 94-01 by stabilizing, repackaging, and removing all remaining plutonium-bearing materials from the Plutonium Finishing Plant. In addition, implements deactivation of the Plutonium Finishing Plant complex.

- Begin processing plutonium solutions through the vertical denitration calciner.
- Initiate plutonium residue cementation and stabilization of polycube material.
- Complete design, procurement, installation, test, and personnel training for the new Plutonium Stabilization and Handling System.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continues funding and construction of the Plutonium Stabilization and Handling System for Plutonium Finishing Plant construction line-item (98-D-453). Included in the totals for this project are $3,136,000 for FY 1998; $10,699,000 for FY 1999; and $16,860,000 for FY 2000 for the line-item.			
■ Continue thermal stabilization of plutonium oxides.			
■ Continue surveillance and maintenance activities related to facility and related systems, as well as surveillance and monitoring of stored nuclear material.			
■ Support International Atomic Energy Agency non-proliferation activities at the Plutonium Finishing Plant. Approximately one metric ton of excess plutonium oxide is stored in the Plutonium Finishing Plant vaults, under international safeguards. This material is routinely inspected by the International Atomic Energy Agency to ensure it has not been diverted toward any nuclear weapons application.			
RL-TP05	57,724	104,136	136,197

Metrics			
Facility Deactivation			
Buildings Not Yet Deactivated	0.0	52.0	52.0
Buildings in Post Deactivation Monitoring	0.0	3.0	3.0
Nuclear Material Stabilization			
Stabilized - Pu Residue (kg)	0.0	0.0	600.0
Stabilized - U in Other Forms (kg)	0.0	78.0	9.0
Stabilized - Pu Solution	0.0	40.0	160.0
Stabilized - Pu Metal/Oxides/Other	0.0	238.0	238.0
Spent Nuclear Fuel			
In Stabilization Process (Not Stabilized) (MTHM)	0.0	0.6	0.6

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
RL-TP08 / 324/327 Facility Transition Project			
This project provides for planning, deactivation, and maintenance of a minimum safe status for the 324/327 facilities, cleanout of the B-Cell in the 324 building, and legacy waste removal from the 327 building. The 324 facility B Cell cleanout is of particular concern, since the facility represents a highly active dispersable hazardous and radioactive material source located adjacent to Hanford's southern boundary with the City of Richland residences and institutions			
■ Continue surveillance and maintenance activities at Buildings 324 and 327.			
RL-TP08	21,068	31,547	27,908
Metrics			
Facility Deactivation			
Buildings Not Yet Deactivated	0.0	14.0	14.0
RL-TP10 / Accelerated Deactivation			
This project provides for deactivation of all Hanford contaminated facilities outside the 300 Area that are not covered in any other Hanford Environmental Management project. There are 48 non-mobile contaminated facilities that will eventually be included under this project, but most are not slated for transition to a safe, inexpensive state until after 2001. Initially, 8 non-mobile facilities will be assessed and characterized, have inventories (including spent nuclear fuel) removed, and develop regulatory, deactivation and post-deactivation plans to achieve shutdown endpoints.			
■ Continue surveillance and maintenance activities.			
■ Develop Building 231 End Point Criteria, necessary regulatory documentation and deactivation plans.			
■ Provides planning necessary for deactivation of three radioactively contaminated facilities; 222T, 222U, and 2704C.			
RL-TP10	2,114	1,738	1,741

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Deactivation			
Buildings Not Yet Deactivated	0.0	47.0	47.0

RL-TP12 / Transition Project Management

This project provides centralized program, project, and business management to plan, execute and control the Facility Stabilization Project. Tasks include common safeguards and security, environmental, safety and health and radiation control, quality assurance, systems engineering, support for technology development implementation, procurement, planning, integration of operations and project management of the Fluor Daniel Hanford contractor.

- Support technical development of the 200 Area Canyon Entombment Project.
- Provide Fluor Daniel Hanford, Inc. project management direction.

RL-TP12	10,776	15,148	15,191

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-TP14 / Hanford Surplus Facility Program 300 Area Revitalization Project

This project reduces the risk to the public, workers and environment of up to 156 excess facilities in the 300 Area by removing, isolating, or stabilizing contaminants, providing surveillance and maintenance to assure releases do not occur, and keeping facilities from further deterioration until final disposition of the facilities is determined.

- Continue minimum safe facility surveillance and maintenance.
- Initiate 300 Area facility assessments and develop a 300 Area project plan.

RL-TP14	735	508	646

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Deactivation			
Buildings Not Yet Deactivated	0.0	36.0	36.0

RL-WM01 / Spent Nuclear Fuels Project

This project will move spent nuclear fuel from wet storage in the K-East and K-West basins near the Columbia River to safe, dry interim storage in the 200 Area Central Plateau. Continued use of these facilities far past their design lives threatens Hanford with a loss of radioactive storage basin water into the surrounding soil and from there potentially into the Columbia River. This project includes: removal and repackaging spent nuclear fuel into multi-canister overpacks, fuel drying, transport and staging, removal of sludge and debris from the K-Basins for appropriate disposition, treating and conditioning the water in the basins, and consolidating spent nuclear fuel in the Central Hanford 200 Area pending final disposition.

- Complete fuel retrieval, drying, transport and storage system testing to support commencement of fuel removal from the K-West basin in early FY 2001.
- Complete K-East modification and begin K-East basin Fuel Retrieval System installation in preparation for K-East basin fuel removal in early FY 2002.
- Continues funding and construction of the Spent Nuclear Fuel Canister and Storage and Stabilization Facility line-item (96-D-406). Included in the funding totals are $21,744,000 in FY 1998; $38,680,000 in FY 1999; and $24,441,000 for FY 2000 for the line-item.

RL-WM01	152,887	170,400	190,955
Metrics			
Spent Nuclear Fuel			
In Stabilization Process (Not Stabilized) (m^3)	276.4	276.0	276.0
In Stabilization Process (Not Stabilized) (MTHM)	2,105.7	2,100.0	2,100.0
Total, Richland	285,146	330,637	376,296

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
RL-TP01 / B-Plant Sub-Project	
■ Decrease is due to completion of post-deactivation activities in FY 1999	-2,716
RL-TP04 / 300 Area/Special Nuclear Materials Sub-Project	
■ The decrease is due to deferring Building 313-S isolation and completion of deactivation activities in the 300 Area	-786
RL-TP05 / Plutonium Finishing Plant Deactivation	
■ The increase is due to Plutonium Stabilization and packaging system acquisition, installation, testing, and training, as well as accelerated plutonium solution stabilization	32,061
RL-TP08 / 324/327 Facility Transition Project	
■ Decrease reflects deferral of Building 324 B-Cell cleanout	-3,639
RL-TP10 / Accelerated Deactivation	
■ No significant change	3
RL-TP12 / Transition Project Management	
■ No significant change	43
RL-TP14 / Hanford Surplus Facility Program 300 Area Revitalization Project	
■ Increase due to deactivation planning for facilities in the 300 Area revitalization project	138
RL-WM01 / Spent Nuclear Fuels Project	
■ Increase will complete major facility construction and installation of retrieval and processing equipment, system acceptance testing, operator training, procedure development, other preparations needed to start spent nuclear fuel retrieval, drying, and relocation operations in early FY 2001	20,555
Total Funding Change, Richland	45,659

Savannah River

Mission Supporting Goals and Objectives

Mission

The Savannah River Site is a key U.S. Department of Energy facility in accomplishing the mission of the Defense Environmental Management, Site/Project Completion account.

The Savannah River Cleanup Program has as its mission the elimination of the legacy that resulted from the production of nuclear materials during the Cold War. This legacy includes contaminated facilities and land areas, many of which still contain nuclear materials and wastes. The Savannah River Site, located near Aiken, South Carolina, covers over 300 square miles and includes five nuclear reactors, two chemical separations facilities, fuel and target fabrication facilities, tritium processing facilities, a heavy water facility, two high-level waste tank farms, low-level waste storage and disposal facilities, a high-level waste treatment facility, the Savannah River Technology Center, and numerous administrative and technical support facilities. These facilities have varying degrees of environmental contamination (soil and groundwater); the majority of which will require some remedial action to address environmental and health risks.

The Savannah River Cleanup program is composed of the following major elements: spent nuclear fuel management, nuclear materials stabilization, waste management (high-level, transuranic, hazardous, mixed low-level, and other), deactivation, remediation, and supporting landlord requirements. This account funds all activities whose life-cycle will be completed by FY 2006.

Program Goal

The Savannah River Site is committed to managing the spent nuclear fuel, stabilizing nuclear materials, and managing all types of wastes using currently available (or near-term) technology and facilities. Eventually, the nuclear materials would be dispositioned, and the remaining spent nuclear fuel and wastes would be sent to geologic repositories. To the extent possible (to be determined through technical analyses, National Environmental Policy Act review, and the regulatory process), Savannah River may be able to assist other sites in eliminating their Cold War "legacies". Savannah River Site personnel will complete stabilization of all spent nuclear fuel and all other nuclear materials (currently scheduled to be received or already received at Savannah River) requiring stabilization in FY 2006. Achievement of this effort depends on attainment of productivity enhancements through 2006.

Program Objectives

Although DOE has ceased production of nuclear materials for defense purposes, and all Savannah River Site reactors are shut down, there remains a significant amount of legacy nuclear materials in the "pipeline", both at Savannah River and across the DOE complex. The program objective is to stabilize these legacy nuclear materials, in various enrichments, concentrations, compounds, forms, and storage configurations that require further treatment/handling in order to place them in a form which can be safely stored until disposition or disposal. Stabilization means that changes must be made (conversion from a liquid to a solid, removal of reactive and other constituents, repackaging, etc.) in the form and/or storage conditions for nuclear materials such that they can be stored with minimal risk to workers, the public, and/or the environment until disposition. As long as significant quantities of nuclear materials in liquid or unstable forms continue to reside in the production facilities, all the attributes of an operating facility must be maintained including security, radiation protection, material control and accountability, trained and certified operator and maintenance personnel, essential safety system operation, emergency response capability, sampling and monitoring, configuration management, fire protection, maintenance of the safety authorization basis, etc. Thus, the cost of continuing to store these materials in their current condition (surveillance and maintenance part of the budget) is very high and approaches the cost of operating the facilities for the "cleanup" mission.

In July 1997, the Secretary of Energy approved the operation of both the F-Canyon and H-Canyon for the stabilization of "at risk" nuclear materials. This dual canyon strategy uses existing processes and facilities specifically designed for these materials, thus optimizing the site's capability for the completion of materials stabilization. Accordingly, the strategy would result in the expeditious stabilization of Savannah River Site nuclear materials in accordance with Defense Nuclear Facilities Safety Board Recommendation 94-1.

The Savannah River Site's F-Canyon and FB-Line will complete stabilization of the Savannah River Site plutonium bearing materials covered by the Defense Nuclear Facilities Safety Board Recommendation 94-1 for processing in these facilities by 2004, and the stabilization of certain Rocky Flats Environmental Technology Site plutonium residues and scrub alloy will be complete by 2002. Receipt and stabilization of a limited amount of these plutonium residues from Rocky Flats supports DOE's goal for the accelerated closure of the Rocky Flats Environmental Technology Site. Development and installation of equipment for vitrifying the americium/curium into borosilicate glass form will be ongoing with stabilization of the americium/curium solution projected to be complete in 2002. H-Canyon will continue to dissolve Mark 16/22 spent fuel. Activities for startup of HB-Line Phase II will also continue.

The two chemical processing canyons at the Savannah River Site, and the related support facilities, provide the capability to stabilize the Savannah River Site legacy materials (as well as some of the legacy materials from other sites in the DOE complex) for interim storage and eventual disposition. As of the end of FY 1998, these facilities had stabilized 3,500 gallons of Pu-242 solutions, 80,000 gallons of Pu-239 solutions, 16,000 corroding targets from the L-Reactor basin, and 144 canisters of failed or de-clad spent fuel. Remaining materials to be stabilized in the canyons include 34,000 liters of Pu-239 bearing solutions, 230,000 liters of enriched uranium bearing solutions, 14,000 liters of americium/curium solution, 6,000 liters of neptunium solutions, 1,900 assemblies of Savannah River

fuels, 900 items of other aluminum-clad fuel and targets, and 2,200 containers of plutonium and uranium vault materials, and over 3,000 containers of plutonium residues from Rocky Flats. Proposed missions include stabilizing about 19 metric tons of heavy metal of additional spent nuclear fuel to address potential health and safety vulnerabilities. Nuclear materials stabilized in the canyons will be stored in the Savannah River Nuclear Material Storage Facility when this facility becomes available, until dispositioned.

Spent nuclear fuel that does not require stabilization for health and safety reasons will require additional treatment or packaging to prepare it for disposal in a geologic repository. The Alternative Technology Project is evaluating a melt and dilute option (preferred) and a co-dispose option (backup) that will provide a suitable form for disposal without separating the fissile element.

Deactivation will begin once the bulk nuclear materials are stabilized/removed from a facility and consists of activities such as removal of hazardous chemicals, flushing and cleanout of systems and equipment, etc., to the point that little contamination or safety risk to workers, the public, and the environment exists. As this is achieved, the attributes of an operating nuclear facility described above (security, radiation protection, material control and accountability, etc.) can be eliminated or substantially curtailed resulting in major reductions in surveillance and maintenance costs. Although additional deactivation would result in significant savings, extensive deactivation of the reactors (C, P and R-Areas), heavy water production (D-Area) ,and fuel fabrication facilities (M-Area) has resulted in major reductions in the annual surveillance and maintenance costs for these facilities. Deactivation is yet to be substantially undertaken in K- and L-Areas, Separations (F and H Areas), and the waste management facilities in S-Area since these facilities are operating and/or still contain substantial quantities of nuclear materials or wastes.

The High-Level Waste program includes funding for construction line-item projects, such as Waste Management Upgrades (96-D-408); H-Tank Farm Storm Water Systems Upgrades (98-D-401); and Tank Farm Support Services F and H Area (99-D-402). The Landlord program includes support for construction line-item projects, such as Plantwide Fire Protection, (90-D-149); Chlorofluorocarbon Heating, Ventilation and Air Conditioning Chiller Retrofit (96-D-471) and Regulatory Monitoring and Bioassay Laboratory (97-D-470).

Performance Measures

Performance Measures are provided at an aggregate level after each Funding by Site table, as well as at the project level in the Detail Justification.

Significant Accomplishments and Program Shifts

- Restarted HB-Line Phase 1 (FY 1998).
- Restarted H-Canyon, first cycle (FY 1998) and restart H-Canyon second cycle (FY 1999).

- Initiated stabilization of Savannah River Site plutonium sweepings (FY 1998) and dissolution of Savannah River Site plutonium sweepings and turnings (FY 1999).
- Completed dissolution of Savannah River Site sand, slag and crucible (FY 1998), and initiate stabilization of Rocky Flats sand, slag and crucible (FY 1999).
- Completed stabilization of remaining Savannah River Site Taiwan Research Reactor spent fuel (FY 1998).
- Continued dissolution of Savannah River Site Mark 16-22 spent fuel (FY 1998).
- Sign contract for sale of excess heavy water (FY 1999).
- Defer construction of the Actinide Packaging and Storage Facility subproject and conduct optimization analysis for surplus plutonium disposition missions that may come to Savannah River (FY 1999).
- Complete detailed design and begin construction activities of the K-Area Nuclear Material Storage Modifications subproject (FY 1999).
- Completed service piping and gang valve systems for three high-level waste tanks (FY 1998).
- Issue draft Savannah River Site spent nuclear fuel management Environmental Impact Statement with preferred alternative treatment for disposal of aluminum-based spent fuel and issue the final Environmental Impact Statement and Record of Decision (FY 1999).
- Begin characterization cabinet operation for characterization/repackaging Savannah River Site plutonium residues for dissolution in HB-line (FY 1999).
- Begin the K-Area Nuclear Materials Storage Modifications subproject construction activities (FY 1999).
- Complete F-Tank Farm electrical upgrades (FY 1999).
- Complete stabilization of Rocky Flats scrub alloy; continue stabilization of Rocky Flats sand, slag, and crucible; complete stabilization of remaining Experimental Breeder Reactor-II spent fuel (subject to the ongoing National Environmental Policy Act); continue declassification of Rocky Flats plutonium metal (subject to the ongoing National Environmental Policy Act); continue characterization and repackaging of plutonium residues; continue dissolution and blending down to low enriched uranium MK-16/22 spent fuel; begin dissolution of additional spent fuel (subject to the ongoing National Environmental Policy Act); begin stabilization of plutonium scrap and mixed scrap; and continue packaging plutonium metal into 3013 inner containers (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
SR-HL09 / Tank Farm Service Upgrades	3,660	1,099	0	-1,099	-100.0%
SR-HL10 / H-Tank Farm Storm Water System Upgrades	1,110	3,633	4,430	797	21.9%
SR-HL11 / Tank Farm Support Services F-Area	0	3,243	4,314	1,071	33.0%
SR-IN01 / Plantwide Fire Protection Line Item	1,257	1,490	637	-853	-57.2%
SR-IN02 / Operations Support Facility Line Item	4,760	0	0	0	0.0%
SR-IN04 / Domestic Water Line Item	540	0	0	0	0.0%
SR-IN05 / Chlorofluorocarbon Heating, Ventilation and Air Conditioning Chiller Retrofit Line Item	10,287	9,702	2,043	-7,659	-78.9%
SR-IN06 / Radio Trunking Line Item	230	0	0	0	0.0%
SR-IN07 / Site Road Infrastructure Line Item	2,776	0	0	0	0.0%
SR-IN08 / High Level Drain Lines Line Item	476	0	0	0	0.0%
SR-IN10 / Regulatory Monitoring and Bioassay Laboratory	6,103	7,542	12,994	5,452	72.3%
SR-IN13 / Decontamination of Laboratory Facility 772-F and 773-A	0	0	2,774	2,774	>999.9%
SR-NM01 / F-Area Stabilization Project	173,799	181,939	206,565	24,626	13.5%
SR-NM02 / H-Area Stabilization Project	132,816	136,304	152,651	16,347	12.0%
SR-NM03 / Savannah River Nuclear Material Storage Line Item	21,292	90,060	7,505	-82,555	-91.7%
SR-NM04 / Canyon Exhaust Line Item	1,826	5,819	0	-5,819	-100.0%
SR-SF01 / K-Reactor Spent Nuclear Fuel Project	29,393	25,845	0	-25,845	-100.0%
SR-SF04 / Heavy Water - D Area	16,133	11,140	0	-11,140	-100.0%
SR-SF06 / Alternate Technology Project	4,592	3,985	3,723	-262	-6.6%
SR-SF07 / Disassembly Basin Upgrade Line Item	2,470	114	0	-114	0.0%
Total, Savannah River	413,520	481,915	397,636	-84,279	-17.5%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Savannah River Site	413,520	481,915	397,636	-84,279	-17.5%
Total, Savannah River	413,520	481,915	397,636	-84,279	-17.5%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Nuclear Material			
Stabilized - Pu Residue (kg Bulk)	0.0	225.0	1,390.0
Stabilized - U in Other Forms Made Disposition-Ready	0.0	0.0	85,608.0
Stabilized - Pu Metal/Oxides	80.0	94.0	0.0
Stabilized - Other Nuclear Material Forms (Handling Units)	147.0	459.0	432.0
Spent Nuclear Fuel			
In Stabilization Process (Not Stabilized) (m^3)	55.3	26.2	0.0
In Stabilization Process (Not Stabilized) (MT)	4.3	2.9	0.0
Made Disposition-Ready - During the Period (m^3)	12.0	16.2	0.0

Site Description

Savannah River

The complex covers 198,344 acres, or 310 square miles encompassing parts of Aiken, Barnwell, and Allendale counties in South Carolina, bordering the Savannah River.

The site is owned by the U.S. Department of Energy and operated by an integrated team led by Westinghouse Savannah River Company. Under the contract that went into effect October 1, 1996, the Westinghouse Savannah River Company is responsible for the site's nuclear facility operations; Savannah River Technology Center; environment, safety, health, and quality assurance; and all of the site's administrative functions. The team also includes Bechtel Savannah River Incorporated (parent company: Bechtel National Incorporated), which is responsible for environmental restoration, project management, engineering and construction activities; Babcock and Wilcox Savannah River Company (parent company Babcock and Wilcox Government Group), which is responsible for facility decontamination and decommissioning; and British Nuclear Fuels Limited Savannah River Corporation (parent company British Nuclear Fuels Limited Incorporated), which is responsible for the Site's solid waste program. Wackenhut, Incorporated is responsible for the Site's physical security program.

While the changing world has caused a downsizing of the site's original defense mission, the future of the Savannah River Site lies in several areas: reducing the nuclear danger; transferring applied environmental technology to government and non-government entities; cleaning up the site and managing the waste the Savannah River Site has produced; and forming economic and industrial alliances.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Savannah River Site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure* report. The funds requested for FY 2000 are appropriate to perform the activities based on the use of the "Activity-Based Costing Methodology" and on an independent review of the programmatic assumptions and projected scope. All construction line-item projects were validated and many projects received an independent cost estimate review.

SR-HL09 / Tank Farm Service Upgrades (96-D-408)

The Tank Farm Services Upgrade project has four parts. Parts 1 and 2: H-Area West Hill service piping and gang valve house upgrades will replace buried service piping with easy access, above-ground trenches and pipe racks, thereby eliminating costly repairs to leaking, buried pipes. These upgrades will also replace the existing gang valve house (which services Tanks 35-37) with 3 new gang valve houses. Part 3: H-Area East Hill cooling water upgrades will replace worn out cooling water pumps and install additional cooling water pumps and heat exchangers to increase cooling water capacity and reliability to support the additional demands of In-Tank Precipitation and Extended Sludge Processing (SR-HL04). Part 4: F-Area electrical upgrades will alleviate overload conditions on a transformer and automatic transfer switch which cause power interruptions and associated unplanned work outages.

- H-Area East Hill Cooling Upgrades: Award a fixed-price construction subcontract to complete construction.
  - Complete construction, including installation of heat exchangers and the internal heat exchanger for Tank 50, replacement of three cooling tower water pumps, and the addition or replacement of three chromate cooling water pumps.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Prior year funds utilized.			
▸ These funding levels include line-item construction funding of $3,100,000 in FY 1998.			
SR-HL09	3,660	1,099	0

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-HL10 / H-Tank Farm Storm Water System Upgrades (98-D-401)

The scope of this project includes evaluation of the entire stormwater collection, retention, and outfall system related to flooding condition surrounding Tanks 9-12H; awarding the design fixed-price contract, completing the detailed design work; awarding a construction fixed-price contract for diversion line replacements and the storm water pumping and monitoring system; and completing construction including installation of new manholes, storm water piping and diversion boxes, and modification to Diversion Box 907-1H and Retention Basin 281-8H.

- Complete construction including new manholes, storm water piping, and modifications to Diversion Box 907-1H and Retention Basin 281-8H for project 98-D-401, H-Tank Farm Storm Water System Upgrades.
- These funding levels include line-item construction funding of $1,000,000 in FY 1998; $3,120,000 in FY 1999, and $2,977,000 in FY 2000.

SR-HL10	1,110	3,633	4,430

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

SR-HL11 / Tank Farm Support Services F-Area (99-D-402)

The scope of this project includes replacement in F-Area Tank Farm of all service lines to Tanks 25-28, 33-34, and 44-47, as well as to the 242-16F evaporator. The existing underground service piping systems will be abandoned in place and not removed, in order to minimize cost, radiological waste generation, and personal radiation exposure

- Award construction subcontract.
- Start construction on the replacement service piping to Tanks 25-28, 33-34, and 44-47, as well as the 242-16F evaporator for project 99-D-402, Tank Farm Support Services F-Area.
- These funding levels include line-item construction funding of $2,745,000 in FY 1999 and $3,100,000 in FY 2000.

SR-HL11	0	3,243	4,314

Metrics

No quantifiable corporate performance measures are associated with this project.

SR-IN01 / Plantwide Fire Protection Line Item (90-D-149)

The project is to design, install, test, start-up and turnover to operation a cost-effective set of fire protection upgrades to numerous existing facilities across the Savannah River Site. The upgrades will be designed to reduce the probability or consequences of a fire that could threaten public health or welfare, pose an undue hazard to site personnel, prevent unacceptable DOE program delays, or cause excessive property damage. The scope of the project has been redefined to limit additional project work to primarily address only life safety issues as defined by national codes and standards relative to fire protection.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The project will provide upgrades to existing facilities in various areas across the entire plant site. Upgrades include new or additional provisions to water supply and distribution systems, sprinkler suppression systems, standpipe and hose stations, manual and automatic fire alarm and detection systems, passive protection features, emergency lighting systems, and elevator recall functions. Upgrades will, or have been accomplished in 100-C, K, and L Areas; Defense Waste Processing Facility (S-Area); and miscellaneous A-Area, N-Area, G-Area and other areas of the Site.			
■ Complete project and close-out of all fire protection systems for the small tasks subproject.			
■ Complete project and financial closure for the Plantwide Fire Protection construction line item and all subprojects within the line item.			
■ No line-item construction funds are requested for this project.			
SR-IN01	1,257	1,490	637

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-IN02 / Operations Support Facility Line Item (92-D-150)

This project constructed office buildings to house operations support personnel at the Savannah River Site.			
■ No activity. Project was completed in FY 1996. Funds were inadvertently recast into this project baseline summary at yearend. Funds should have been recast into SR-SF02, L-Reactor Spent Nuclear Fuel, for operational support of L-Reactor.			
SR-IN02	4,760	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SR-IN04 / Domestic Water Line Item (93-D-147)			
Project encompasses upgrades to the site domestic water treatment, storage and distribution systems to comply with the State of South Carolina's Department of Health and Environmental Controls drinking water regulation.			
■ No activity. Project was completed in FY 1998.			
■ No line-item construction funds are requested for this project.			
SR-IN04	540	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-IN05 / Chlorofluorocarbon Heating, Ventilation and Air Conditioning Chiller Retrofit Line Item (96-D-471)			
Project provides for replacement or retrofit of refrigeration chillers containing chlorofluorocarbons that are located in various facilities sitewide.			
■ Complete facility plans for the replacement of the chiller at the Defense Waste Processing Facility and start design.			
■ Complete facility plans for A-Area.			
■ Complete design of HB-Line.			
■ These funding levels include line-item construction funding of $8,500,000 in FY 1998; $8,000,000 in FY 1999, and $931,000 in FY 2000.			
SR-IN05	10,287	9,702	2,043

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-IN06 / Radio Trunking Line Item (95-D-156)			
The radio trunking system incorporates the use of a computer controlled radio repeater system that automatically assigns unused radio channels to each user as needed.			
Most conventional plant radios will be replaced with the trunked radios and transferred to the radio trunking system. Site security and emergency systems will be converted to trunked capability first.			
■ No activity. Project was completed in FY 1998.			
■ No line-item construction funds are requested for this project.			
SR-IN06	230	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
SR-IN07 / Site Road Infrastructure Line Item (95-D-155)			
This project upgrades the Savannah River Site bridges 603-IG; 603-2G; 603-3G and 603-7G. Permit packages will be prepared, traffic surveys performed, design and specifications reviewed, and preparation of the Savannah River Site traffic coordination plans.			
■ No activity. Project was completed in FY 1998.			
■ These funding levels include line-item construction funding of $2,713,000 in FY 1998.			
SR-IN07	2,776	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SR-IN08 / High Level Drain Lines Line Item (93-D-148)			
The High Level Drain Lines project provided for the replacement of a high-level radioactive drain line system in the Analytical Laboratory, including the demolition and removal of the existing drain system.			
■ No activity. Project was completed in FY 1998.			
■ No line-item construction funds are requested for this project.			
SR-IN08	476	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-IN10 / Regulatory Monitoring and Bioassay Laboratory (97-D-470)

This project will design, build and equip a new Regulatory Monitoring and Bioassay Laboratory for the Environmental Monitoring and Health Physics Technology departments of the Environmental, Safety, Health and Quality Assurance Division at the Savannah River Site. The new facility will continue to provide full compliance with Occupational Safety and Health Administration, radiation protection requirements, industrial hygiene and environmental protection requirements as detailed in Federal and state regulations and DOE Orders. The Regulatory Monitoring and Bioassay Laboratory will house the equipment and personnel to support site requirements to sample, prepare and analyze environmental media (air, water, soil) for radiological, chemical and biological parameters, develop technologies to clean and monitor the environment, and for the determination, evaluation and documentation of personnel exposure to radioactive materials. The new laboratory and support facilities will include laboratory modules, sample preparation areas, analytical instrument rooms, mechanical and electrical support services, storage space, and offices for technical and administrative personnel. The structural, mechanical, electrical and architectural design provisions will consider expansion capability for additional laboratory modules and associated support features.

- Construction of the laboratory is projected to be 95 percent complete.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Utilities will be installed, including the sanitary sewer; all will be fully operational			
■ Major components, such as heating, ventilation and air conditioning, fume hoods, fire protection systems and laboratory modules will be installed and contractor testing will be initiated.			
■ The parking lot will be completed.			
■ These funding levels include line-item construction funding of $5,600,000 in FY 1998; $7,000,000 in FY 1999, and $12,200,000 in FY 2000.			
SR-IN10	6,103	7,542	12,994

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-IN13 / Decontamination of Laboratory Facility 772-F and 773-A (00-EXP)

The project will decontaminate areas of the service floor of 772-F and decontaminate and replace the roof of 773-A. Approximately 15,000 square feet of the area in Building 772-F will be decontaminated. The project will also replace parts of the 773-A roof equipment to preclude any additional contamination from occurring due to leaking exhaust components. At 773-A, approximately 40,000 square feet of contaminated roofing area will be replaced, as well as approximately 110,000 square feet of non-contaminated leaking roof area will be replaced. Leaks through the contaminated roofing are currently contaminating interior laboratory modules, requiring significant expense to decontaminate work areas.

- This project is a new start operating expense funded line-item project.
- The initial task will be to obtain a fixed-price architect/engineer to complete the "state-of-the-art" decontamination study and to create two specifications for obtaining two subcontractors for installation work scheduled to begin in early FY 2001.
- Award of the contract is expected in late FY 2000.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Perform design and begin urgent roof repairs to Building 773-A.			
SR-IN13	0	0	2,774

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-NM01 / F-Area Stabilization Project

This project involves converting the Savannah River Site "at-risk" nuclear materials into stable forms suitable for interim to long-term storage using the F-Canyon, FB-Line, 235-F, and supporting facilities. Additionally, a limited quantity of certain off-site nuclear materials from the Rocky Flats Environmental Technology Site are to be stabilized using these facilities. The majority of the Savannah River Site materials stabilization activities are in accordance with the Department's commitments in response to the Defense Nuclear Facilities Safety Board Recommendation 94-1 (Improved Schedule for Remediation in the Defense Nuclear Facilities Complex). Additional nuclear materials proposed to be processed in the F-Canyon facilities include a limited volume of spent nuclear fuel that represents a potential health and safety vulnerability. Stabilization of this spent nuclear fuel is not a DOE Defense Nuclear Facilities Safety Board 94-1 commitment. A decision for the management of these fuels is projected for 1999 following the completion of the Savannah River Site Spent Nuclear Fuel Management Environmental Impact Statement.

- Continue modifications to the F-Canyon Multi-purpose Processing Facility in preparation for vitrification of americium/curium.
- Continue to transfer depleted uranium material to H-Area.
- Continue characterization activities on material in inventory for stabilization and/or repackaging.
- Continue the stabilization of the Rocky Flats Environmental Technology Site plutonium residues and scrub alloy.

SR-NM01	173,799	181,939	206,565

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Nuclear Material			
Stabilized - Pu Residue (kg Bulk)	0.0	225.0	1,390.0
Stabilized - U in Other Forms Made Disposition-Ready	0.0	0.0	85,608.0
Stabilized - Pu Metals/Oxides	80.0	94.0	0.0
Stabilized - Other Nuclear Material Forms (Handling Units)	147.0	459.0	432.0

SR-NM02 / H-Area Stabilization Project

The purpose of the H-Area Stabilization project is to stabilize "at risk" nuclear materials and spent fuel followed by the deinventory of HB-Line and H-Canyon and transition them to minimum surveillance and maintenance status until they can be turned over for final decontamination and decommissioning. To accomplish this, nuclear materials that remained in the processing pipeline at the end of the Cold War must be converted to stable forms. These activities will take place in accordance with the Department's implementation plan for Defense Nuclear Facilities Safety Board Recommendation 94-1 and the Savannah River Site Interim Management of Nuclear Materials Environmental Impact Statement. Other drivers for these activities are the Plutonium and Highly Enriched Uranium Vulnerability Assessments and Materials Disposition Environmental Impact Statements.

The following stabilization activities remain for H-Area:

- Reprocess Mark-16 and 22 spent nuclear fuel and separate the highly enriched uranium for blending to low enriched uranium.
- Reprocess miscellaneous spent nuclear fuels.
- Dissolve Pu-239 residues in HB-Line.
- Convert Pu-239 solution to oxide in HB-Line.
- Deinventory HB-Line vault.
- Blend existing highly enriched uranium solutions and those created from processing of Mark-16 and 22 spent fuels with depleted uranium solutions to create low enriched uranium for potential use in commercial reactor fuel.
- Convert Neptunium-237 solutions to oxide in HB-Line.
- Dissolve low assay Pu-238 residues.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue to reprocess Mark-16 and 22 spent nuclear fuel and separate the highly enriched uranium for blending to low enriched uranium.			
■ Continue dissolving plutonium scrap and residues in HB-Line.			
■ Continue preparations for startup of HB-Line Phase II.			
Note: The Department is planning to submit an FY 1999 reprogramming that will increase the funding by $17,748,000. This will permit hiring of personnel to start up HB-Line (Phase II) to stabilize nuclear materials. If the reprogramming is not endorsed, Savannah River will postpone the start-up of Phase II up to 6 months.			
SR-NM02	132,816	136,304	152,651

Metrics	
Nuclear Material Stabilization *	* Metrics for PBSs SR-NM01 and SR-NM02 are combined. Separation of these metrics would create classified metrics.
Stabilized - Pu Residue (kg Bulk)	
Stabilized - U in Other Forms Made Disposition-Ready	
Stabilized - Pu Metals/Oxides	
Stabilized - Other Nuclear Material Forms (Handling Units)	

SR-NM03 / Nuclear Material Storage Line Item (97-D-450)

This project will provide interim and long-term storage and handling capability for stabilized Savannah River Site , Rocky Flats and Hanford nuclear materials awaiting disposition (should a decision be made pursuant to National Environmental Policy Act reviews). This project consists of two subprojects: the Actinide Packaging and Storage Facility which will store (and repackage, as necessary) the stabilized plutonium, and the K-Area Nuclear Materials Storage Modifications subproject will store stabilized plutonium from Rocky Flats which is needed to sufficiently accelerate Rocky Flats shipments to the Savannah River Site for closure by 2006.

- Finish subcontract construction work on the K-Area Nuclear Materials Storage Modifications subproject.
- Startup and operate the K-Area Nuclear Materials Storage Modifications subproject.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ These funding levels include line-item construction funding of $18,000,000 in FY 1998; $79,184,000 in FY 1999, and $4,000,000 in FY 2000.			
Note: The Department is planning to submit an FY 1999 reprogramming that decreases the funding for the Actinide Packaging and Storage Facility subproject by $44,000,000. This will permit the mission of this subproject to be re-evaluated in light of DOE's preferred alternatives for the Department's plutonium disposition mission. If the reprogramming is not endorsed, Savannah River shall defer all construction until the mission re-evaluation is complete.			
SR-NM03	21,292	90,060	7,505

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-NM04 / Canyon Exhaust Line Item (92-D-140)

This project replaces the aging critical electrical and mechanical exhaust equipment in both F- and H-Canyons that will provide for reliable contamination control consistent with the Savannah River Site safety criteria and Federal and State air exhaust and underground tank regulations. The project scope is divided into three design packages: design package-1 covers the rerouting of the canyon recycle vessel vent systems, design package-2 removes and replaces the six underground diesel fuel storage tanks, and design-package-3 replaces the existing canyon exhaust fan and diesel houses. FY 1999 funding is required to continue the project and cover procurements which substantially exceeded the original cost estimates. (This funding level reflects plant and operating expense funds).

- 292-F and H fan replacement work will be completed and financial closure will occur.
- These funding levels include line-item construction funding of $3,667,000 in FY 1999. (See note below.)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Note: The Department is planning to submit an FY 1999 reprogramming that will increase funding for this critical project by $26,252,000. This will permit accelerated replacement of vital safety equipment. If the reprogramming is not endorsed, Savannah River may have to shut down one or both of the canyons due to failure of the fans and motors.			
SR-NM04	1,826	5,819	0

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-SF01 / K-Reactor Spent Nuclear Fuel Project

The K-Reactor spent nuclear fuel project provides basin storage of the Savannah River Site spent nuclear fuel awaiting stabilization, as well as storage for heavy water and nuclear materials awaiting disposition. K-Area also serves as an administrative and operational support location for all spent nuclear fuel storage activities.

- Safely manage the spent nuclear fuel stored in the basin.
- A mission for interim storage of special nuclear material from DOE Rocky Flats has been added to the scope of this (K-Reactor spent nuclear fuel) project. With addition of this mission, the K-Reactor area will not be available for deactivation in FY 2002 as previously planned. Storage of Rocky Flats plutonium is scheduled to continue until FY 2012. This change in mission requires this Project Baseline Summary to be moved to the Post 2006 Completion account in FY 2000.

SR-SF01	29,393	25,845	0

Metrics			
Spent Nuclear Fuel Stabilized			
In Stabilized Process (Not Stabilized) (m^3)	55.3	26.2	0.0
In Stabilized Process (Not Stabilized) (MT)	4.3	2.9	0.0
Made Disposition-Ready - During the Period (m^3)	12.0	16.2	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-SF04 / Heavy Water - D Area			
The heavy water processing project provides for the consolidated storage of heavy water into K-Reactor. The K-Reactor was previously modified to provide storage of 3,000 drums of heavy water.			
■ The Heavy Water Processing project has previously been included in the Site/Project Completion account with the cost of operations offset by heavy water sales revenue. Previously, heavy water rework (RW) and Dupont water (DW) operations in D-Area were scheduled to cease by December 2000. Recent events surrounding the sale of heavy water places the Heavy Water program into the Post 2006 Completion account in FY 2000 because the tritium removal and heavy water deliveries will continue through FY 2008.			
SR-SF04	16,133	11,140	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
SR-SF06 / Alternate Technology Project			
The purpose of the Alternative Technology project is to develop alternative treatment and packaging technologies for aluminum-based research reactor spent nuclear fuel, with specific focus on direct co-disposal with high-level waste and melt and dilute/poison technologies, that would put the spent nuclear fuel in a form suitable for geologic disposal without necessarily separating the fissile materials.			
■ The Alternate Technology project will support the Spent Nuclear Fuel Treatment and Storage initiative, resolve any remaining technical issues (e.g., reducing off-gas contamination), and support the repository licensing process requirements. Additional confirmatory development of the "melt and dilute" technology will be supported.			
SR-SF06	4,592	3,985	3,723
Metrics			
No quantifiable corporate performance measures are associated with this			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SR-SF07 / Disassembly Basin Upgrade Line Item (95-D-158)			
This project provides for modifications to the L-Area basin to permit receipt and storage of research reactor fuels in a number of different type of transportation casks. The legal weight truck subproject provides the capability to handle the legal weight truck and National Lead, Incorporated, casks in L-Area without negating the current capability to process other type fuel transportation casks.			
The High Flux Isotope Reactor subproject provides modular storage racks and associated equipment to allow the storage of 60 high flux isotope reactor cores. These racks are being installed in the bucket storage area of the 105-L Reactor Area Disassembly Basin. Fuel handling tools will be supplied to unload the fuel casks and place the fuel element on a fuel carrier.			
■ No activity. Project will be completed in FY 1999.			
SR-SF07	2,470	114	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
Total, Savannah River	413,520	481,915	397,636

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
SR-HL09 / Tank Farm Service Upgrades	
■ The Tank Farm Service Upgrade project will be completed in FY 2000 using prior year funding	-1,099
SR-HL10 / H-Tank Farm Storm Water System Upgrades	
■ Increase in funding level based on construction schedule	797
SR-HL11 / Tank Farm Support Services F-Area	
■ Increase in funding level based on construction schedule	1,071
SR-IN01 / Plantwide Fire Protection Line Item	

	FY 2000 vs. FY 1999 ($000)
■ Project will be completed and closed out	-853
SR-IN05 / Chlorofluorocarbon Heating, Ventilation and Air Conditioning Chiller Retrofit Line Item	
■ Decrease in funding due to delays in project schedule	-7,659
SR-IN10 / Regulatory Monitoring and Bioassay Laboratory	
■ Increase in funding level based on construction schedule	5,452
SR-IN13 / Decontamination of Laboratory Facility 772-F and 773-A	
■ Funds support first year funding for design activities of an operating expense funded project including critical roof repairs to Building 773-A	2,774
SR-NM01 / F-Area Stabilization Project	
■ Additional funding required to continue construction of the F-Canyon Multi-Purpose Processing Facility stabilization project and continue development needed to support the vitrification of americium/curium solution	24,626
SR-NM02 / H-Area Stabilization Project	
■ Additional funds required for preparations for startup of HB-Line Phase II	16,347
SR-NM03 / Savannah Nuclear Material Storage Line Item	
■ Decrease in funding level based on deferring the Actinide Packaging and Storage Facility subproject until its mission is re-evaluated in light of the potential plutonium disposition missions	-82,555
SR-NM04 / Canyon Exhaust Line Item	
■ No FY 2000 funds are requested due to a planned FY 1999 reprogramming that will increase this project by $26,252,000. This will permit accelerated replacement of vital safety equipment which has been failing	-5,819
SR-SF01 / K-Reactor Spent Nuclear Fuel Project	
■ Project moved to the Post 2006 Completion account because of extended mission to store plutonium from the Rocky Flats Environmental Technology Site	-25,845
SR-SF04 / Heavy Water - D Area	
■ Decrease in activity due to deinventory the 400 Area. Project moved to the Post 2006 Completion account due to long-term delivery schedule of the heavy water	-11,140
SR-SF06 / Alternate Technology Project	
■ Decrease due to focus on development of a single, relatively mature, technology	-262
SR-SF07 / Disassembly Basin Upgrade Line Item	
■ Project closed out in FY 1999	-114
Total Funding Change, Savannah River	-84,279

Major Issues

Site budgets are being challenged by ongoing nuclear materials stabilization activities, new initiatives to support other Environmental Management site closures, and new emerging programs (e.g , alternative spent nuclear fuel treatment capabilities). Key to accomplishing the programmatic objectives in FY 2000 is the successful reprogramming of funds in FY 1999 from the Savannah River Nuclear Materials Storage Project (97-D-450) to support H Canyon nuclear materials stabilization programs and for the safety upgrades to canyon exhaust systems provided in the Upgraded Canyon Exhaust System upgrade project (92-D-140). Should this reprogramming be unsuccessful, nuclear materials stabilization activities in H Canyon would likely be extended by two years, failing to address commitments made in response to the Defense Nuclear Facilities Safety Board Recommendation 94-1. If the upgrades provided in the Upgraded Canyon Exhaust System project are deferred, one or both canyons may be shut down to provide assurance of safe conditions.

Given the Department's recent decisions to name the Savannah River Site as the preferred location for surplus plutonium immobilization, plutonium conversion to mixed-oxide fuels and for surplus plutonium pit disassembly and conversion, the storage requirements that were to be addressed by the Actinide Packaging and Storage Facility subproject need to be reexamined. Should all of these missions be located at Savannah River, optimization of the suite of plutonium storage, immobilization and conversion needs is necessary. The optimization analyses must be completed in a timely manner to allow for completion of plutonium stabilization and interim storage of the inventory of plutonium currently stored at the Savannah River Site.

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	13,478	11,400	7,440	-3,960	-34.7%
Accelerator Improvement Projects	0	0	0	0	0%
Capital Equipment	24,003	10,044	10,186	142	1.4%
Total, Capital Operating Expense	37,481	21,444	17,626	-3,818	-17.8%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
99-D-402 Tank Farm Support Services, F&H Area, SR	18,599	0	0	2,745	3,100	12,754
99-D-404 Health Physics Instrumentation Laboratory, ID	11,900	0	0	950	7,200	3,750
98-D-401 H-Tank Storm Water Systems Upgrade, SR	8,934	0	1,000	3,120	2,977	1,837
98-D-453 Plutonium Stabilization and Handling System for PFP, RL	38,600	0	3,136[a,b]	10,699[c]	16,860	7,905
98-D-700 INEEL Road Rehabilitation, INEEL	10,800	0	500	7,710	2,590	0

[a] Reflects FY 1998 Internal Reprogramming of $5,000,000 by the Richland Operations Office from the original appropriation of $8,136,000.

[b] Does not reflect prior year uncosted reduction of $1,885,000 included in the FY 1999 Energy and Water Development Appropriation.

[c] Reflects FY 1999 reduction of $16,115,000 from new budget authority to meet uncosted reduction included in the FY 1999 Energy and Water Development Appropriation.

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998	FY 1999	FY 2000	Unapprop-riated Balance
97-D-450 Savannah River Nuclear Material Storage, SR	184,000	17,400	18,000	81,344[a,b]	4,000	63,256
97-D-451 B-Plant Safety Class Ventilation Upgrades, RL	4,317	1,917	2,400	0	0	0
97-D-470 Regulatory Monitoring and Bioassay Laboratory, SR	30,280	2,500	5,600	7,000	12,220	2,960
96-D-406 Spent Nuclear Fuels Canister Storage and Stabilization Facility, RL	188,537	103,672	21,744	38,680	24,441	0
96-D-408 Waste Management Upgrades, VL (Kansas City Plant and Savannah River Subprojects)	10,732	7,632	3,100	0[c]	0	0
96-D-461 Electrical Distribution Upgrade, INEEL	10,756	7,829	2,927	0	0	0
96-D-464 Electrical and Utility Systems Upgrade, INEEL	53,452	14,952	14,985	11,544	11,971	0
96-D-471 CFC HVAC/Chiller Retrofit, SR	45,000	10,041	8,500	8,000	931	17,528
95-D-155 Upgrade Site Road Infrastructure, SR	10,500	7,787	2,713	0	0	0
95-D-456 Security Facilities Consolidation, INEEL	15,100	14,013	602	485	0	0
92-D-140 F&H Canyon Exhaust[d] Upgrades, SR	30,067	21,900	0	3,667	0	4,500

[a] $2,160,000 of the $8,500,000 will be recast to EM from FY 1997 Office of Fissile Materials Disposition unobligated funds, Project 97-D-140. The EM appropriation for FY 1999 is $79,184,000.

[b] The Department is planning to submit an FY 1999 reprogramming that decreases the funding for the Actinide Packaging and Storage Facility subproject by $44,000,000. The mission of this subproject will be reevaluated in light of DOE's preferred alternatives for the Department's plutonium disposition mission.

[c] Reflects FY 1999 Conference Mark which transfers $4,512,000 from project 96-D-408, Waste Management Upgrades to project 93-D-187, High-Level Waste Removal from Filled Waste Tanks at the Savannah River Site.

[d] An FY 1999 reprogramming is being prepared in the amount of $22,000,000.

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
92-D-172 Hazardous Waste Treatment and Processing Facility, Pantex Plant, AL	6,000	1,000	5,000	0	0	0
86-D-103 Decontamination and Waste Treatment Facility, LLNL	62,362	42,661	11,250	3,712[a]	2,000	2,739
Subtotal, Construction Funded		253,304	101,457	179,656	88,290	117,229
Operating Expense Funded						
00-EXP Laboratory Facilities Roof and Shielded Area Restoration, 773-A & 772-F, SR	14,660	0	0	0	2,774	11,886
96-EXP Americium/Curium Vitrification, SR	40,349	11,995	2,336	3,701	11,940	10,377
Subtotal, Operating Expense Funded		11,995	2,336	3,701	14,714	22,263
Total, Project Funding		265,299	103,793	183,357	103,004	139,492

[a] Prior year funds used as an offset for FY 1999 uncosted reduction, $1,040,000. Original appropriation was $4,752,000.

99-D-402, Tank Farm Support Services, F Area, Savannah River Site, Aiken, South Carolina (SR-HL11)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

- Tank Farm Support Services scopes of work have been adjusted to facilitate improved project management and work execution between this line item and the 93-D-187, "High-Level Waste Removal from Filled Waste Tanks" line item.
- All F Tank Farm Support Service work scope has been transferred into this line item.
- All H Tank Farm Support Service work scope has been consolidated into the 93-D-187 line item.
- The net effect of the adjusted work scope is a reduction in the total estimated cost and total project cost from $22,073,000 to $18,599,000 and $32,014,000 to $23,966,000, respectively. These reductions were due to a revised conceptual design and more detailed estimate that includes the above described work scope.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	2Q 2000	3Q 2000	3Q 2002	22,073	32,014
FY 2000 Budget Request *(Preliminary Estimate)*	"	"	"	"	18,599	23,966

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	1,322	1,322	1,322
2000	404	404	404
2001	441	441	441
2002	252	252	252
Construction			
1999	1,423	1,423	0
2000	2,696	2,696	4,119
2001	7,311	7,311	7,311
2002	4,750	4,750	4,750

3. Project Description, Justification and Scope

The service systems for the Type III (horizontal cooling coil bunch) and IIIA (vertical cooling coils) Tanks in the F-Area Tank Farm provide such systems as steam, plant air, instrument air, breathing air, flush water, cooling water, inhibited water, bearing water, and domestic water to facility components. The tanks and associated process facilities served by the service systems are expected to support long-term operations for waste processing, waste removal, and tank closure at the Savannah River Site

The purpose of this plant modification is to replace existing direct buried service piping with new below grade trench contained pipelines or new above ground piping systems. The replacement piping for the F-Area Tank Farm shall include all service lines provided to Tanks 25-28, Tanks 33-34, Tanks 44-47, and the 242-16F evaporator. The existing underground service piping systems will be abandoned in place rather than be removed to minimize cost, radiological waste generation, and personal radiation exposure in support of As Low As Reasonably Achievable.

The service piping for F-Area Tank Farm has been in place since the late 1960s and early 1970s These lines have been developing leaks that are hard to locate and expensive to repair. Over the past 7 years, approximately 100 repairs of underground piping in F- and H-Area have been required at a cost of $8 million. These leaks also result in unscheduled facility outages which have significant operational costs and performance impacts. Relocation of service piping above grade will provide accessibility, minimize future maintenance costs, and provide service reliability necessary to support waste transfer

The FY 2000 funds will be used to complete definitive design, award the construction fixed-price contract, and begin construction.

The scope of this project was rebaselined in FY 1998. Scope of work proposed for H-Area has been deleted and appropriate adjustments to cost and schedule completed Consistent with long-term high-level waste program strategy, the H-Area scope of work can be more effectively managed as part of the proposed High-Level Waste System Upgrades line item (93-D-187).

4. Details of Cost Estimate [a]

	(dollars in thousands) Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (8.3% of total estimated cost (TEC))	1,550	1,875
Design management costs (2.4% of TEC)	452	200
Total, engineering, design, inspection, and administration of construction costs (10.8% of TEC)	2,002	2,075
Construction phase		
Other (major utilities/comp items, specialized facilities, etc.)	11,651	13,179
Inspection, design and project liaison, testing, checkout and acceptance	0	1,098
Construction management (9.9% of TEC)	1,846	900
Total, construction costs	13,497	15,177
Contingencies		
Design phase (2.2% of TEC)	417	600
Construction phase (14.4% of TEC)	2,683	4,221
Total, contingencies (16.7% of TEC)	3,100	4,821
Total, line item costs (TEC)	18,599	22,073

5. Method of Performance

Design will be performed by a fixed-price contractor for the Management and Operating contractor at the Savannah River Site. Construction and procurement will be accomplished utilizing fixed-price subcontracts awarded on the basis of competitive bidding, where possible.

[a] The DOE escalation rates (percent per year) are not segregated due to conceptual nature of estimate.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	0	0	1,322	404	441	252	2,419
Construction	0	0	0	4,119	7,311	4,750	16,180
Total facility costs (Federal and Non-Federal)	0	0	1,322	4,523	7,752	5,002	18,599
Other project costs							
Conceptual design cost [a]	246	243	0	0	0	0	489
Other project-related costs [b]			904	1,314	1,366	1,294	4,878
Total other project costs	246	243	904	1,314	1,366	1,294	5,367
Total project costs (TPC)	246	243	2,226	5,837	9,118	6,296	23,966

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	200	200
Annual facility maintenance and repair costs	100	100
Programmatic effort related to facility	0	0
Other annual costs	100	100
Total related annual funding *(operating from FY 2003 through FY 2028)*	400	400

[a] The conceptual design will be completed at an approximate cost of $489,000.

[b] In FY 2000, $1,314,000 will be used to support final design, construction efforts and permitting; $2,660,000 in outyears will be used to support construction and startup testing.

99-D-404, Health Physics Instrumentation Laboratory, Idaho Falls, Idaho (ID-OIM-109)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter					
	A-E Work Initiated	A-E Work Completed	Physical Construct Start	Physical Construct Complete	Total Estimated Cost ($000)	Total Project Cost ($000)
FY 1999 Budget Request (*Preliminary Estimate*)	2Q 1999	3Q 2000	4Q 2000	3Q 2002	11,900	12,670
FY 2000 Budget Request (*Preliminary Estimate*)	"	"	"	"	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	950	950	900
2000	179	179	229
2001	0	0	0
2002	0	0	0
Construction			
1999	0	0	0
2000	7,021	7,021	1,871
2001	3,069	3,069	6,600
2002	681	681	2,300

3. Project Description, Justification and Scope

This project provides for the design, procurement, and construction activities to provide for a new Health Physics Instrument Laboratory at the Idaho National Engineering and Environmental Laboratory. Because of the nature of business at the Idaho National Engineering and Environmental Laboratory, radioactive detection services and personnel dosimeters are required to ensure a safe and healthful workplace for Idaho National Engineering and Environmental Laboratory workers. This project will provide a new facility for the servicing, calibrating, and testing of radiation detection instruments used in radioactive environments. The purpose of the Health Physics Instrument Laboratory is to provide, repair, and maintain radiation detection instruments; evaluate newly developed instruments; and research and develop new methods of radiation detection. The project will also support needs for the irradiation, calibration, quality control, and quality assurance of electronic dosimeters.

This facility provides laboratories for the neutron, gamma, alpha, and beta calibration and irradiation of instrumentation. A low energy x-ray system will provide for low energy photon characterization and irradiation. The primary sources that will be used for the isotopic calibrations are Cesium-137, Plutonium-239, Californium-252, and Cobalt-60. Several other low activity isotopes will be used for general characterization of the instruments.

The facility will respond to site users' requirements by providing quick response for calibration, irradiation, and turn around of dosimeters and radiological instrumentation. The assumptions used to develop project, scope, schedule, and cost are:

a. The new Health Physics Instrument Laboratory facility will be required to meet American National Standards Institute N232 guidelines as specified by DOE Order 5480.11. "Radiation Protection for Occupational Workers."

b. The new facility is based on code requirements for safe/handling of radioactive sources, operations associated with equipment testing and calibration, functional layout of the building and shielding requirements for each radioactive source and surrounding areas.

c. The cost estimate is based on preliminary building layouts and construction techniques associated with radioactive shielding as developed by the operating program.

d. The construction schedule is consistent with historical construction at the Idaho National Engineering and Environmental Laboratory.

e. Studies may be required during the execution of this project to ensure that all requirements associated with this facility are met and scope may need to be modified as studies recommend.

The continued use of the existing Health Physics Instrument Laboratory facility results in excessive maintenance and operational costs. The current deficiencies with American National Standards Institute, National Electrical Code, and Occupational Safety and Health Act standards, as well as DOE Orders, require significant resources of time and money to correct. Continued expenditure of the resources is not a viable solution due to the age of the facility, which is planned for future demolition. The inadequate space, design, structure, systems, and age of the current Health Physics Instrument Laboratory facility pose the following operational limitations and inherent safety and code deficiencies:

a. Inadequate number and design of shielded rooms for performance of x-ray, gamma, and neutron source calibrations. These calibrations are required to be performed under compliance with American National Standards Institute N323. N42.17A and N43.5 guidelines.

b. Absence of environmental testing capabilities to meet American National Standards Institute N323.

c. Inadequate environmental control, leading to wide fluctuations in temperature throughout the facility. American National Standards Institute N323 and MIL-SID-45662A require a properly controlled environment for the calibration of radiation detection instruments.

d. Significant safety concerns such as asbestos in walls, floor tiles, and ceiling materials throughout the building: inadequate coverage by fire sprinkler system, in violation of National Fire Protection Association Standards; numerous electrical safety problems, in violation of Occupational Safety and Health Act Standard 1910.303 and National Electrical Code; lead based paint on all painted surfaces;

and significant roof leakage. Numerous deficiencies were identified in the Occupancy Readiness Review conducted on CFA-633 in 1991.

e. Lack of proper shielding in rooms used for performing calibrations, significantly increasing personnel radiation exposure rates at several locations accessible to personnel during performance of calibrations, identified by Tiger Team Corrective Action Plan Number EGG1/RP.89.1.CP01 "Upgrade Health Physics Instrument Laboratory Capabilities for Space and Testing Standards." The shielding does not meet As Low As Reasonably Achievable requirements.

f. Insufficient work space to consolidate all Idaho National Engineering and Environmental Laboratory instrument calibrations in the existing Health Physics Instrumentation Laboratory to obtain site-wide standardization of calibrations. This issue was raised in Tiger Team Corrective Action Plan Number EGG1/RP.8.1.CP01 "Upgrade Health Physics Instrument Laboratory Capabilities for Space and Testing Standards."

The deficiencies noted above contribute to the inability of the existing Health Physics Instrumentation Laboratory to perform its function in a compliant manner. Due to the age and deteriorated condition of the building, future additions and modifications are cost prohibitive. The facility has been identified for closure and demolition; however, until a replacement facility can be provided for the Health Physics Instrumentation Laboratory operations, the CFA-633 phase out cannot occur. Construction of a new Health Physics Instrumentation Laboratory facility will eliminate the excessive maintenance and repair expense necessary to bring the existing facility into compliance and will avoid the additions to the deteriorated building that would be required to comply with American National Standards Institute N323. A Health Physics Instrumentation Laboratory type facility would still be required on-site regardless of obtaining off-site calibration services. The on-site facility would be required to provide a centralized service for performing as-found inspections, shipping, receiving, and verification of the instrumentation calibration. All off-site suppliers use a disclaimer that states the calibrations were performed to the required specification, but do not warranty that the instrument remains properly calibrated after shipping. In addition, differing atmospheric conditions can impact the accuracy of the instruments. These situations require that some calibration capability must be maintained at the Idaho National Engineering and Environmental Laboratory to verify instrument calibrations. During the design phase of this project, Idaho National Engineering and Environmental Laboratory mission needs will be reviewed and changes made to effectively address facility requirements.

The requested FY 2000 budget appropriation will authorize the subcontractors to start physical construction.

4. Details of Cost Estimate.[a]

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and final design costs (design drawings and specifications)	658	659
Design management costs (<1% of TEC)	40	236
Project management costs (1.6% of TEC)	189	0
Total, Engineering, design, inspection and administration of construction costs (7.5% of TEC)	887	895
Construction Phase		
Improvements to Land	378	378
Buildings	4,648	5,087
Utilities	212	0
Other (major utilities, specialized facilities, etc)	0	194
Specialized Equipment	0	2,237
Standard Equipment	2,465	0
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	299	299
Construction management costs (2% of TEC)	218	225
Project management costs	208	0
Total, Construction Costs	8,428	8,420
Contingencies		
Design Phase (2.0% of TEC)	242	775
Construction Phase (19.7% of TEC)	2,343	1810
Total, Contingency (approximately 21.7% of TEC)	2,585	2,585
Total, Line Item Costs (TEC)	11,900	11,900

5. Method of Performance

The Department of Energy Idaho Operations Office shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE Idaho Operations Office project management shall be performed by the Office of Infrastructure Management. Safety, environmental, and other project support shall be furnished to the project on matrix basis by the DOE Idaho Operations Office organization.

Lockheed Martin Idaho Technologies Company, as operating contractor, shall provide project management services to coordinate all project activities. Lockheed Martin Idaho Technologies Company shall be responsible for the development of the project's technical requirements, completion of the architectural and engineering design, review and management of the engineering and construction activities, coordination of long-lead procurement of construction materials and equipment, construction

[a] The Conceptual Design is 100 % complete. Escalation rates applied to this cost estimate were FY 1999-2.4 percent; FY 2000-2.8 percent; FY 2001-2.7 percent; and FY 2002-2.8 percent.

subcontracting, coordination of the activities of construction subcontractors, checkout of systems, and turnover of the completed project.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost						
Facility Cost						
Design	0	900	229	0	0	1,129
Construction	0	0	1,871	6,600	2,300	10,771
Total Facility Costs (Federal and Non-Federal)	0	900	2,100	6,600	2,300	11,900
Other Project Costs						
Conceptual design costs	200	0	0	0	0	200
NEPA documentation costs [a]	30	25	20	10	10	95
Other project-related costs [b]	50	75	90	110	150	475
Total Other Project Costs	280	100	110	120	160	770
Total Project Costs (TPC)	280	1,000	2,210	6,720	2,460	12,670

7. Related Annual Funding Requirements

(FY 2003 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	988	0
Annual facility maintenance/repair costs	216	1,416
Annual utility costs	212	0
Total related annual funding (operating from FY 2003 through FY 2023)	1,416	1,416

[a] NEPA documentation cost - NEPA cost for this period includes environmental checklist verification that facility descoping did not change the approved Funding Of No Significant Impact/Environmental Assessment on Health Physics Instrument Laboratory. Environmental activities during this period includes state air permit preparation and preliminary storm water pollution plan development.

[b] Other project related costs - This category includes the costs associated with the preparation of the Project Execution Plan, project validation and revalidation, operational funded design reviews, safety, quality, program support of other facility alterations and existing Health Physics Instrument Laboratory facility tours. System Operational testing, operational readiness reviews, move-in costs and operationally funded configuration management activities for the completed facility are also included.

98-D-401, H-Tank Farm Storm Water System Upgrade, Aiken, South Carolina (SR-HL10)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- The total project cost has been reduced from $13,321,000 to $12,155,000. The reduction is the result of completion of conceptual design resulting in better defined workscope and cost estimate.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	2Q 1998	2Q 1999	2Q 1999	4Q 2000	12,000	14,860
FY 1999 Budget Request *(Preliminary Estimate)*	"	"	"	"	8,934	13,321
FY 2000 Budget Request *(Title I Baseline)*	"	"	3Q 1999	"	"	12,155
FY 2001 Budget Request *(Current Baseline Estimate)*	"	"	"	2Q 2001	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1998	400	400	294
1999	150	150	204
2000	25	25	70
2001	24	24	31
Construction			
1998	600	600	0
1999	2,970	2,970	1,910
2000	2,952	2,952	4,588
2001	1,813	1,813	1,837

3. Project Description, Justification and Scope

This project alleviates existing flooding problems surrounding tanks 9-12H and the potential for unsafe tank top loading conditions, as well as the flooding of the ditch located at the base of West Hill on the south side of H-Tank Farm. The removal of storm water from tanks 9-12H top area will increase safety margins and minimize rain water infiltration to these waste tanks. This project considers the entire storm water system that affects or is affected by this flooding situation, including storm water runoff from the West Hill north slope, storm water runoff from all zones that exit the diversion box 907-1H, the capacity of the retention basin 281-8H and flow into Four Mile Creek.

The flooding conditions in the waste tank 9-12H area must be eliminated in order to prevent the spread of radioactive contamination violating South Carolina Hazardous Waste Management Regulations (SCHWMR) R 61-79.265.31. This flooding condition impacts the waste tanks' annulus pans and primary spaces; spreads radioactive contamination; creates unsafe conditions; violates As Low As Reasonably Achievable principles and creates additional waste volume. If the flooding condition surrounding tanks 9-12H is not corrected, the potential for injury to personnel and tank top overloading will continue to exist In addition, this project will increase the storage basin operating capacity by 100 percent (~4,000,000 gallons) allowing the storage of the design basis storm water volume precluding uncontrolled discharge to the local outfall. This project will also provide features that will reduce or eliminate overflow from existing manholes. The FY 1998 funds will be used to develop a design Task Order Proposal Request, award the design fixed-price contract, and complete the detailed design work. In addition, a construction fixed-price contract specification will be prepared for a FY 1999 Construction Start. FY 2000 funds will be used to complete construction of the H-Tank Farm Storm Water System Upgrades barring unforseen site conditions which require substantial application of contingency. FY 2001 funds will be used to complete construction.

The gross annual facility costs are estimated to be $400,000 upon completion of the facility in FY 2001.

4. Details of Cost Estimate.[a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (4.7% of total estimated cost (TEC))	419	437
Design management costs (0.5% of TEC)	46	47
Total, engineering, design, inspection, and administration of construction costs (5.2% of TEC)	465	484
Construction phase		
Other (major utilities/comp items, specialized facilities, etc.)	5,219	5,116
Inspection, design and project liaison, testing, checkout and acceptance	815	899
Construction management (4.2% of TEC)	373	373
Total, construction costs	6,407	6,388
Contingencies		
Design phase (1.5% of TEC)	134	212
Construction phase (21.6% of TEC)	1,928	1,850
Total, contingencies (23.1% of TEC)	2,062	2,062
Total, line item costs (TEC)	8,934	8,934

5. Method of Performance

Design will be performed by a fixed-price contractor for the Management and Operating contractor at the Savannah River Site. Construction and procurement will be accomplished utilizing fixed-price subcontracts awarded on the basis of competitive bidding, where possible.

[a] The DOE escalation rates used for this estimate are as follows: FY 1997-1.9 percent; FY 1998-2.6 percent; FY 1999-2.7 percent; and FY 2000-2.8 percent. The above estimate includes $462,000 for escalation.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost.[a]							
Design	0	294	204	70	31	0	599
Construction	0	0	1,910	4,588	1,837	0	8,335
Total facility costs (Federal and Non-Federal)	0	294	2,114	4,658	1,868	0	8,934
Other project costs							
Conceptual design cost	280	0	0	0	0	0	280
Other project-related costs.[b]	0	70	1,209	1,327	335	0	2,941
Total other project costs	280	70	1,209	1,327	335	0	3,221
Total project costs (TPC)	280	364	3,323	5,985	2,203	0	12,155

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	200	200
Annual facility maintenance and repair costs	100	100
Programmatic effort related to facility	0	0
Other annual costs	100	100
Total related annual funding *(operating from FY 2001 through FY 2033)*	400	400

[a] Total cost of construction is $8,934,000, these funds will be used for design, construction, and project management.

[b] $2,941,000 will support final design, preliminary construction planning efforts, permitting, construction, and startup testing.

98-D-453, Plutonium Stabilization and Handling System for PFP, Richland, Washington (RL-TP06)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [ ] in the left margin)

Significant Changes

- The procurement of the Stabilization and Packaging System equipment is now planned as a phased procurement which expedites receipt and startup of packaging equipment, and then receipt and startup of stabilization equipment.
- The project total funding estimate was repriced due to introduction of Hanford site adders.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	2Q 1998	3Q 1999	1Q 1999	4Q 2000	27,200	38,270
FY 1999 Budget Request *(Current Baseline Estimate)*	"	"	"	"	36,600	44,100
FY 2000 Budget Request *(Current Baseline Estimate)*	3Q 1998	4Q 1999	3Q 1999	3Q 2003	38,600	46,100

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1998	3,136 [a]	1,251 [b]	824
1999	1,164 [b]	1,164	1,591
2000	0	1,885	1,885
Construction			
1999	9,535 [b]	9,535	7,240
2000	16,860	14,975	16,250
2001	5,100	5,100	5,120
2002	2,805	4,690	3,200
2003	0	0	2,490

3. Project Description, Justification and Scope

In May 1994, the Defense Nuclear Facilities Safety Board issued Recommendation 94-1 which urged the U.S. Department of Energy to remediate liquids and solids containing fissile material to a form more suitable for safe interim storage within a reasonable time period. The Department of Energy accepted DNFSB Recommendation 94-1, and outlined its corrective actions in a February 1995 Implementation Plan. In January 1995, Department of Energy Technical Standard DOE-STD-3013-96 was issued as the basis for 50-year storage of surplus plutonium with a plutonium content greater than 50 percent by weight. This standard requires that the plutonium-bearing material be thermally stabilized at 1000°C with a loss-on-ignition of less than 0.5 percent by weight. Following thermal stabilization, the material must be packaged in a standardized package configuration capable of keeping the material in a safe and stable state for the full time period. A national consensus team has designed the standardized packages with two welded stainless steel containers surrounding a stainless steel convenience can compatible with mechanized handling.

The Plutonium Finishing Plant currently does not have a system capable of stabilizing or packaging large quantities of plutonium-bearing solids to these specifications. Vault fixtures in the Plutonium Finishing Plant secure vaults and related laboratory equipment are not large enough to accommodate the standardized containers, and the cooling capacity of vault air conditioning units is at maximum.

This project provides an automated Stabilization and Packaging System that is capable of stabilizing and packaging the current inventory of >50 percent plutonium-bearing material stored in the plant's vaults. To accommodate the new standardized container configuration, this project will also modify selected

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[a] Reflects FY 1998 Internal Reprogramming of $5,000,000 by the Richland Operations Office from the original appropriation of $8,136,000.

[b] Reflects FY 1999 reduction of $16,115,000 from new budget authority and $1,885,000 from prior year to meet uncosted reduction included in the FY 1999 Energy and Water Development Appropriation.

Plutonium Finishing Plant vault fixtures and upgrade nondestructive assay measurement systems, such as calorimetry and isotopic measurement systems, to measure package plutonium content. The stabilization and packaging capability, and corresponding vault and equipment modifications are critical to the Department of Energy's commitment to safely store plutonium in the standardized container.

The scope of this project is to procure and install the Stabilization and Packaging System equipment via a phased approach to an existing national procurement contract, to modify selected Plutonium Finishing Plant vault fixtures, and to upgrade nondestructive assay measurement systems. Facility infrastructure will be modified to support this new stabilization and packaging system and the standardized container configuration.

The Stabilization and Packaging System will be installed in the Plutonium Finishing Plant Plutonium Storage Vault complex, Building 2736-ZB. Deliverables associated with the Stabilization and Packaging System procurement include the following:

- Engineering, analysis, design, fabrication, delivery, and testing of the Stabilization and Packaging System equipment,
- Utility interface requirements;
- System safety basis;
- Operating, maintenance, and training procedures and manuals,
- Testing and startup procedures;
- Design, testing and procurement of a small initial quantity of standardized package components,
- Personnel training and technical assistance during startup.

The Stabilization and Packaging System will have the capability to receive and unload plutonium containers; stabilize plutonium oxides; package plutonium metals and oxides; meet material control and accountability requirements; and provide radiological containment and shielding. Detailed design, equipment procurement, and installation of the system will be complete by September 2000, and will be ready for beneficial use by May 2001. Stabilization equipment will be installed by March 2001 and available for beneficial use by July 2001.

This project also makes the necessary facility modifications to support installation and operation of the Stabilization and Packaging System and storage of the standardized containers. Modifications to 2736-ZB Building include:

- Capacity and control upgrade of the ventilation fan and exhaust filtration systems;
- Addition of support services for the Stabilization and Packaging System such as bottled gas supplies for package inerting and welding, dry air for glovebox inerting, off gas treatment, stack constant air monitoring capability, electrical supply upgrades and closed loop cooling for laser welder;
- Rearrangement of facility functions currently housed in the proposed location for the Stabilization and Packaging System;

- Upgrade of laboratory equipment for calorimetry, gamma spectroscopy, radiography;
- Architectural modifications of office areas and air locks to allow Stabilization and Packaging System operations.
- Modification of selected Plutonium Finishing Plant vault fixtures to store the new standardized package;
- Modification of vault security equipment related to storage fixtures;
- Upgrade of cooling capacity to accommodate the standardized containers in an efficient configuration.

The FY 1998 appropriation was used to begin definitive design required prior to Stabilization and Packaging System procurement, and to compile the technical specification for the procurement. Procurement will be initiated as early as possible in FY 1999. The FY 1999 appropriation will be used to complete definitive design, provide procurement of long-lead items for the packaging equipment, complete the infrastructure design, and initiate construction of infrastructure modifications. The FY 2000 appropriation will be used to install and test the Stabilization and Packaging System packaging equipment, initiate installation of the Stabilization and Packaging System stabilization equipment, and complete facility infrastructure modifications.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (7.3% of total estimated cost (TEC))	2,810	2,250
Design management costs (2.0% of TEC)	790	260
Total, engineering, design, inspection, and administration of construction costs (9.3% of TEC)	3,600	2,510
Construction phase		
Buildings and improvements to land	5,900	5,750
Specialized equipment	18,800	18,430
Inspection, design and project liaison, testing, checkout and acceptance	1,000	340
Construction management (5.2% of TEC)	2,000	2,670
Total, construction costs	27,700	27,190
Contingencies		
Design phase (1.8% of TEC)	700	1,000
Construction phase (17.1% of TEC)	6,600	5,900
Total, contingencies (18.9% of TEC)	7,300	6,900
Total, line item costs (TEC)	38,600	36,600

5. Method of Performance

Design and inspection will be performed by the onsite engineer-construction contractor. Construction work will be performed to the maximum extent possible by fixed-price contractors. The operating contractor will provide project management during design, procurement, and construction of the project.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	0	824	1,591	1,885	0	0	4,300
Construction	0	0	7,240	16,250	5,120	5,690	34,300
Total facility costs (Federal and Non-Federal)	0	824	8,831	18,135	5,120	5,690	38,600
Other project costs							
Conceptual design cost	900	0	0	0	0	0	900
NEPA documentation costs	0	0	30	0	0	0	30
Other project-related costs	250	440	1,200	3,840	340	500	6,570
Total other project costs	1,150	440	1,230	3,840	340	500	7,500
Total project costs (TPC)	1,150	1,264	10,061	21,975	5,460	6,190	46,100

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.)	5,307	N/A
Annual facility maintenance and repair costs	900	N/A
Programmatic operating expenses directly related to the facility	20,000	N/A
Other annual costs	7,802	N/A
Total related annual funding *(operating from FY 2001 through FY 2005)*	34,009	N/A

98-D-700 INEEL Road Rehabilitation, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho (ID-OIM-108)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total ProjectCost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request *(Preliminary Estimate)*	2Q 1998	2Q 1999	3Q 1999	3Q 2001	10,800	11,400
FY 1999 Budget Request *(Preliminary Estimate)*	"	"	"	"	"	"
FY 2000 Budget Request *(Current Baseline)*	"	"	"	"	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1998	500	500	221
1999	43	43	132
2000	0	0	0
2001	0	0	0
Construction			
1998	0	0	0
1999	7,667	7,667	6,001
2000	2,590	2,590	4,151
2001	0	0	295

3. Project Description, Justification and Scope

This project provides for the design, procurement, and rehabilitation of approximately 45 miles of existing roadways and approximately 27,000 square yards of parking areas within the Idaho National Engineering and Environmental Laboratory. The rehabilitation actions include the redesign and construction of intersections to reduce safety concerns during waste transportation and other vehicle traffic, widening of roadways, modification of drainage patterns, resloping of shoulders, and renovation of roadways and parking lots. The following methods of construction will be utilized according to the degree of deterioration:

a. Excavation and reconstruction of the roadway from the base up through the paved surface.

b. Base removal and construction, on sections of roadways where base deterioration has occurred, and application of an asphalt overlay.

c. Application of an asphalt overlay to the roadway.

d. Application of an open graded plant mix seal coat.

e. Application of a seal coat, including crack repair.

The Idaho National Engineering and Environmental Laboratory has over 87 miles of paved roads within its 890 square mile boundary. In addition to this primary transportation network, over 100 miles of unpaved service roads allow access to remote areas for security, environmental experiments and sampling, maintenance activities, and emergency vehicles. Road construction projects are part of a continuing program to preserve/extend the useful life and upgrade the Idaho National Engineering and Environmental Laboratory transportation infrastructure. This project is necessary to provide for safe and effective programmatic support. During the 1980's, the Idaho National Engineering and Environmental Laboratory received sufficient funding to sustain the road program; however, no significant projects have been completed since 1990.

This project is necessary to continue to provide support for all present and future Idaho National Engineering and Environmental Laboratory activities. It supports DOE's mission to provide safe and environmentally compliant transportation routes for waste shipments in support of the October 17, 1995 court order and transportation of soil borrow to meet various Idaho National Engineering and Environmental Laboratory regulatory and compliance issues under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and other authorities. The project directly supports the Sitewide specific planning goal of providing roads which meet the State of Idaho Highway Construction Specifications, American Association of State Highway and Transportation Officials, and the Idaho National Engineering and Environmental Laboratory engineering standards.

The Idaho National Engineering and Environmental Laboratory uses the U.S. Army Corps of Engineers' computerized pavement management system, "PAVER," to assess the condition of the paved roadway network. This information will be used in conjunction with the transportation routes addressed above to determine priorities and rehabilitation efforts.

The Lockheed Martin Idaho Technologies Company Retirement Unit Catalog (CFO-FSD-CNM-98-002)

was used for making the correct funding determination and proper capitalization decision. The project is a Betterment and Improvement to property record units or retirement units that cost $25,000 or more and extends the useful life of the record/retirement unit.

The requested FY 2000 budget appropriation will be used to complete construction activities.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and final design costs (design drawings and specifications)	364	364
Design management costs (< 1% of TEC)	7	93
Project management costs (< 1% of TEC)	86	0
Total, Engineering, design, inspection and administration of construction costs (4.3% of TEC)	457	457
Construction Phase		
Improvements to land	7,510	7,510
Inspection, design and project liaison, testing, checkout and acceptance	209	209
Other (major utilities/comp items, specialized facilities, etc.)	0	132
Construction management costs (5.0% of TEC)	542	542
Project management costs	132	0
Total, Construction Costs	8,393	8,393
Contingencies		
Design Phase (<1% of TEC)	86	86
Construction Phase (17.3% of TEC)	1,864	1,864
Total, Contingency (approximately 18.1% of TEC)	1,950	1,950
Total, Line Item costs (TEC)	10,800	10,800

5. Method of Performance

The Department of Energy Idaho Operations Office shall be responsible for implementation of the project, including selection of principal contractors and approval of specified procurement actions. DOE Idaho Operations Office project management shall be performed by the Construction Management Group in the Office of Program Execution. Safety, environmental, and other project support shall be furnished to the project on an as-needed basis by the DOE Idaho Operations Office matrix organization.

The design, project management, and construction management shall be performed by the operating contractor. Construction and procurement shall be accomplished by fixed price contracts awarded on the

[a] The Conceptual Design is 100% complete. Escalation rates applied to this cost estimate were FY 1998-2.5%; FY 1999-2.7%;FY 2000-2.9%;and FY 2001-3.0%.

basis of competitive bidding. Inspection may be performed by another agent. Check-out of systems, and maintenance of the completed project shall be performed by the operating contractor.

The Idaho National Engineering and Environmental Laboratory operating contractor Project Manager shall be responsible for the entire project: design, all construction activities at the Idaho National Engineering and Environmental Laboratory site, construction subcontracting, direction of the activities of construction subcontractors, and performance and management of construction activities as required to complete the project in a timely, safe, and cost-effective manner.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost						
Facility Cost						
Design [a]	221	322	0	0	0	543
Construction [b]	0	5,811	4,151	295	0	10,257
Total Facility Costs (Federal and Non-Federal)	221	6,133	4,151	295	0	10,800
Other Project Costs [c]						
Conceptual design costs	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	44	256	200	100	0	600
Total Other Project Costs	44	256	200	100	0	600
Total Project Costs (TPC)	265	6,389	4,351	395	0	11,400

[a] Design - The cost is based upon the conceptual design that was completed in March 1996. The Conceptual Design cost estimate was prepared utilizing the Idaho National Engineering and Environmental Laboratory Cost Estimating Manual and DOE Order 5700.2D.

[b] Construction - The cost is based upon the conceptual design that was completed in March 1996. The Conceptual Design cost estimate was prepared utilizing the Idaho National Engineering and Environmental Laboratory Cost Estimating Manual and DOE Order 5700.2D.

[c] Other Project Related Costs - This category includes the costs associated with the hazardous waste determination, Operating Contractor Construction Support, Quality and Safety audits, document control, design and constructability reviews, Facility Acceptance Review, and project closeout.

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility maintenance/repair costs	153	153
Total related annual funding (operating from FY 2001 thru FY 2021)	153	153

97-D-450, Savannah River Nuclear Material Storage (formerlyActinide Packaging and Storage Facility), Savannah River Site, Aiken, South Carolina (SR-NM03)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin).

Significant Changes

- The DOE has concluded it prudent to halt further progress on the Actinide Packaging and Storage Facility subproject and conduct a systems engineering evaluation of plutonium material management functions and planned facilities at the Savannah River Site, considering benefits and efficiencies available through designing and constructing facilities with an eye toward shared systems, economies of scale, and improved safety margins. Such systems engineering evaluations have been supported by the Defense Nuclear Facilities Safety Board, and the Savannah River Site has recently initiated efforts to take a fresh look at current storage availability and the magnitude of the future plutonium mission at the Savannah River Site.

  Existing storage capacity at the Savannah River Site and storage capability proceeding in K-Area will support receipt of Rocky Flats non-pit material and materials currently at the Site. If the evaluation reveals that an alternative to the Actinide Packaging and Storage Facility can be accommodated, this could affect the Fissile Materials Disposition program in two ways: (1) an amended Record of Decision to move the Hanford material to the Savannah River Site would have to be developed, and (2) an alternative to the Actinide Packaging and Storage Facility subproject for the receipt and storage of materials for the Immobilization and Associated Processing Facility, project number 00-D-142, would have to be addressed.

- The DOE is planning to submit a reprogramming action to reapply the Actinide Packaging and Storage Facility subproject funds to other urgent requirements.

- If the reevaluation reveals that the Actinide Packaging and Storage Facility subproject is still required, the Department will proceed with project activities in FY 2001 based on a revised, integrated storage design. This will delay facility operations by approximately 3 years

- The narrative contained in the following pages generally reflects the previously proposed mission of the Actinide Packaging and Storage Facility subproject prior to the decision to demobilize.

The K-Area Nuclear Material Storage Modifications subproject (S-W226) total estimated cost has been reduced by $14,000,000 from $41,000,000 to $27,000,000. The procurement of the 9975 shipping containers will be the responsibility of Rocky Flats. This change results in a reduction in the total estimated cost and total project cost of this project from $198,000,000 to $184,000,000 and $245,900,000 to $231,900,000, respectively.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1997 Budget Request *(Preliminary Estimate)*	1Q 1997	1Q 1998	2Q 1998	3Q 2001	109,838	138,753
FY 1999 Budget Request *(Title I Baseline)*	"	2Q 1998	"	"	198,000	245,900
FY 2000 Budget Request *(Current Baseline Estimate)*	"	"	"	3Q 2004	184,000	231,900

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1997	16,585[a]	16,585	8,625
1998	5,008	5,008	8,687
1999	0	0	2,435
2000	0	0	925
Outyears	0	0	921
Construction			
1997	815[a]	815	789
1998	12,992	12,992	9,017
1999	81,344[b,c]	81,344	73,154
2000	4,000	4,000	17,112
Outyears	63,256	63,256	62,335

[a] As a result of the Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Materials dated January 14, 1997, the Actinide Packaging and Storage Facility storage capacity for stabilized Special Nuclear Material will be increased from 2,000 to 5,000 positions to accommodate the receipt of additional surplus plutonium (pending completion of National Environmental Policy Act documentation). The cost, schedule, and technical impact of this change is reflected herein. Additional FY 1997 funding of $9,500,000 is contained within the Office of Fissile Materials Disposition appropriation, Project 97-D-140, Consolidated Spent Nuclear Materials Storage Facility. The balance of the Office of Fissile Materials Disposition funding for the expansion of the Actinide Packaging and Storage Facility vault ($8,500,000) is included in EM's budget for FY 1999. The original appropriation for FY 1997 was $7,900,000.

[b] $2,160,000 of the $8,500,000 will be recast to EM from FY 1997 Office of Fissile Materials Disposition unobligated funds, Project 97-D-140. The EM appropriation for FY 1999 is $79,184,000.

[c] The Department is planning to submit an FY 1999 reprogramming that decreases the funding for the Actinide Packaging and Storage Facility subproject by $44,000,000. The mission of this subproject will be reevaluated in light of DOE's preferred alternatives for the Department's plutonium disposition mission.

3. Project Description, Justification and Scope

Actinide Packaging and Storage Facility Subproject S-6061:

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
157,000	17,400	16,000	60,344 *	0	63,256	TBD

The Department of Energy committed, in the Implementation Plan for the Defense Nuclear Facilities Safety Board Recommendation 94-1, to meet the DOE Criteria for Safe Storage of Plutonium Metal and Oxides (DOE-STD-3013) by May 2002 The existing vaults in the Savannah River Site facilities are not sufficient or capable of meeting the commitments in the Defense Nuclear Facilities Safety Board Recommendation 94-1 Implementation Plan; therefore, the Actinide Packaging and Storage Facility must be constructed. The Savannah River Site has determined that a new Actinide Packaging and Storage Facility is the safest (to the worker and environment), and the most economical option compared to the major modification and refurbishing of existing Savannah River Site facilities and to a "no action" option A life cycle cost estimate demonstrated that a new Actinide Packaging and Storage Facility has the lowest total associated cost with a payback period of approximately 10 years

The Actinide Packaging and Storage Facility will provide for thermal stabilization, repackaging, and safe, secure, cost-effective storage of the special nuclear material to meet DOE-STD-3013-96, Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage The facility will be constructed in F-Area with a hardened and buried structure of approximately 50,000 square feet containing the Material Access Area. Included in the Material Access Area are the contaminated waste water collection tanks, truck bay, safe havens, and elevator vestibule. The Material Access Areas will be supported above grade by several soft structures including an Entry Control Facility, and Auxiliary Mechanical Equipment Building, and various technical support structures. These structures total approximately 47,000 square feet and contain heating, ventilation, and air conditioning support equipment, diesel generators, maintenance areas, instrumentation, security equipment, and other administrative functions. All structures will be designed to meet applicable National standards and DOE Orders.

Specifically, the facility will consist of process areas and equipment for truck unloading/loading, material confirmation, shipping, packaging and unpackaging, accountability measurements, safety evaluation, International Atomic Energy Agency inspections, repackaging, waste management, a vault room with automated accessible storage bays, and full support and administration functions. For vault surveillance and container handling, automation will be used to minimize exposure. Additionally, a bagless transfer operation will be used to minimize exposure for the transfer of special nuclear material from the existing containers to containers designed for interim storage. Due to the importance and significance of the International Atomic Energy Agency Program, equipment and instrumentation costs will be estimated and tracked separately from all other control accounts on this subproject. Most of the special nuclear material in the Actinide Packaging and Storage Facility will be under international safeguards which will be

* The Department is planning to submit an FY 1999 reprogramming that decreases the funding for the Actinide Packaging and Storage Facility subproject by $44,000,000. The mission of this subproject will be reevaluated in light of DOE's preferred alternatives for the Department's plutonium disposition mission.

conducted by the International Atomic Energy Agency. Domestic safeguards instrumentation will be used, where possible, but additional instrumentation will be provided specifically for international safeguards. The estimated cost of these additional items is summarized in Section 4 of this data sheet.

Utilities and services required will include electricity, potable process water, chemical storage, steam, compressed air, standard and high-efficiency particulate air filtered ventilation, and communications.

The FY 1999 funding will be utilized to demobilize the project and evaluate the path forward. Outyear funding will be utilized to support integration with other plutonium disposition activities.

This subproject will:

(1) Provide safe and secure interim storage for special nuclear material until final dispositioning options are selected.

(2) Provide a cost-effective central storage facility to consolidate current special nuclear material inventory which meets the DOE standard for storage of plutonium metals and oxides and the time table recommended by the Defense Nuclear Facilities Safety Board.

(3) Enable the deinventory of the canyon facilities and thereby reduce staffing and security requirements.

(4) Reduce worker radiation exposure by providing automation (where feasible) for container storage retrieval and positioning.

(5) Provide a location for International Atomic Energy Agency inspection to meet non-proliferation objectives.

K-Area Nuclear Material Storage Modifications Subproject S-W226:

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
27,000	0	2,000	21,000	4,000	0	4th Qtr. FY 1998 - 4th Qtr. FY 2000

Existing K-Area facilities will be modified to provide cost-effective interim storage of non-pit plutonium metals and oxides from Rocky Flats. Modifications will include dismantling and removing unused process equipment in four building areas: Stack Area, Crane Maintenance Area, Crane Wash Area, and Process Room. These areas total approximately 30,000 square feet, are within the security areas that existed for reactor operations, and are adjacent to a currently active Material Access Area for Highly Enriched Uranium storage. Security systems in the four building areas will be reactivated and upgraded to support using these Material Access Areas for interim plutonium storage. Existing systems including the K-Area security perimeter, security control system, and building water/power ventilation support systems will be utilized by this project. Building modifications will provide for truck unloading/loading, material confirmation, shipping, accountability measurements, and storage in the Material Access Areas. The plutonium stored in K-Area will not be subject to International Atomic Energy Agency controls. (NOTE: The 9975 canister purchase will be the responsibility of Rocky Flats, and therefore has been removed from the cost baseline of subproject S-W226.

FY 1999 funding will be used to continue design, construction activities, ready the facility for the receipt and storage of the initial shipments. FY 2000 funding will be used to complete construction activities.

This subproject will:

(1) Provide secure interim storage for special nuclear material until dispositioned.

(2) Enable early shipments from Rocky Flats and facilitate an early closure of the Rocky Flats facilities (FY 2006)

(3) Provide the necessary confirmatory and accountability equipment to support safeguards requirements.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (9.8% of total estimated cost (TEC))	18,010	19,210
Design management costs (1.2% of TEC)	2,275	1,790
Project management costs (0.2% of TEC)	426	0
Total, engineering, design, inspection, and administration of construction costs (11.3% of TEC)	20,711	21,000
Construction phase		
Buildings & improvements to land	75,362	85,149
Specialized equipment (safeguard equipment and IAEA equipment)	6,659	2,731
Other (major utilities/comp items, specialized facilities, etc.)	42,570	48,691
Removal cost less salvage	1,721	5,190
Inspection, design and project liaison, testing, checkout and acceptance	2,489	3,843
Construction management (2.9% of TEC)	5,264	5,294
Project management (1.1% of TEC)	2,068	0
Total, construction costs	136,133	150,898
Contingencies		
Design phase (0.5% of TEC)	882	1,005
Construction phase (14.3% of TEC)	26,274	25,097
Total, contingencies (14.8% of TEC)	27,156	26,102
Total, line item costs (TEC)	184,000	198,000

5. Method of Performance

Design, construction, and procurement shall be accomplished by the Management and Operating Contractor. Specific scopes of work within this project shall be accomplished by fixed-price contracts awarded on the basis of competitive bidding

[a] Department of Energy established escalation rates were used as provided in June 1996.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility cost						
Design	8,625	8,687	2,435	925	921	21,593
Construction	789	9,017	73,154	17,112	62,335	162,407
Total facility costs [a] (Federal and Non-Federal)	9,414	17,704	75,589	18,037	63,256	184,000
Other project costs						
R&D necessary to complete project [b]	3,653	0	0	0	0	3,653
Conceptual design cost	658	0	0	0	0	658
Other project-related costs [c]	2,020	10,327	7,882	15,000	8,360	43,589
Total other project costs	6,331	10,327	7,882	15,000	8,360	47,900
Total project costs (TPC)	15,745	28,031	83,471	33,037	71,616	231,900

7. Related Annual Funding Requirements

(FY 2004 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.)	22,843	27,943
Annual facility maintenance and repair costs	4,214	3,514
Programmatic effort related to facility	0	100
Other annual costs	7,443	2,443
Total related annual funding *(operating from TBD through TBD)*	34,500	34,000

[a] The line item TEC is $184,000,000 which includes $22,000,000 in government furnished Plutonium Stabilization and Packaging System equipment.

[b] These costs include development of the Laser Sampling system, Digital Radiography Inspection system and container assay equipment.

[c] These costs include technical support during design and construction preparation of operating procedures and operator training, startup testing, and execution of the Operational Readiness Review/Operational Readiness Evaluation.

97-D-470, Regulatory Monitoring and Bioassay Laboratory (formerly Environmental Monitoring Laboratory), Savannah River Site, Aiken, South Carolina (SR-IN10)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- Date physical construction starts was changed from 4th Quarter FY 1999 to the 2nd Quarter FY 1999 to reflect dates in approved baseline change proposal Baseline Change Proposal-004.
- The other project costs for "Prior Years" were previously overstated and have been reduced by $500,000. Outyear other project costs funding requirements were also modified to reflect project needs, but overall other project costs requirements have remained within the $3,120,000 baseline.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated [a]	A-E Work Completed [b]	Physical Construction Start	Physical Construction Complete		
FY 1997 Budget Request *(Preliminary Estimate)*	2Q 1997	3Q 1998	4Q 1998	2Q 2000	30,280	33,690
FY 1998 Budget Request *(Current Baseline Estimate)*	"	"	"	"	"	"
FY 1999 Budget Request *(Current Baseline Estimate)*	"	4Q 1998	4Q 1999	2Q 2001 [c]	"	33,400
FY 2000 Budget Request *(Current Baseline Estimate)*	"	"	2Q 1999	"	"	"

[a] Date original design for Project 97-D-470 started. Architect/engineer design terminated in 4th Quarter FY 1997 in order to merge with line-item Project 97-D-473, Health Physics Site Support Facility.

[b] Does not include support for the construction procurement cycle. Includes 8 months of abandoned Environmental Monitoring Laboratory design and 8 months of new Title I and II design, excluding procurement bid cycle.

[c] Project extended one year due to rebaselining the project, preparing a new definitive design and increasing construction time due to an increase in the facility size.

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2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1997	2,500	2,500	1,455
1998	431	431	1,400
1999	0	0	76
Construction			
1997	0	0	0
1998	5,169	5,169	0
1999	7,000	7,000	8,570
2000	12,220	12,220	12,681
2001	2,960	2,960	6,098

3. Project Description, Justification and Scope

This project combines Project 97-D-473, Health Physics Site Support Facility with Project 97-D-470, Environmental Monitoring Laboratory, into a single laboratory facility. The Environmental Monitoring Laboratory project is renamed Regulatory Monitoring and Bioassay Laboratory. This project will efficiently design, build, and equip a new laboratory providing essential environmental monitoring and personnel bioassay analyses capabilities for the Savannah River Site. This facility will provide continued full compliance with the Occupational Safety and Health Administration requirements, radiation protection requirements, industrial hygiene and environmental protection requirements as detailed in Federal and state regulations and DOE Orders. It will house sections for the equipment and personnel to support site requirements to sample, prepare, and analyze environmental media (air, water, soil, and biota) for radiological, chemical and biological parameters, develop technologies to clean and monitor the environment, and for the determination, evaluation, and documentation of personnel exposure to radioactive materials Also, it will include laboratory modules, sample preparation areas, analytical instrument rooms, mechanical and electrical support services, important personnel dosimetry records retention area, laboratory storage space, and offices for technical and administrative personnel. The structural, mechanical, electrical and architectural design provisions will consider the facilitation of potential structural and internal modifications in support of future growth or additional laboratory modules and support features. The facility size will be approximately 81,000 square feet, and will be finalized during definitive design. The facility will be divided into three major functional areas: 1) laboratory, 2) office and administration, and 3) service and general use basement. The laboratory section includes; sampling rooms, non-radiological laboratory modules, radiochemistry laboratory models, radio-analytical counting rooms, in-vitro bioassay laboratories and storage rooms. In addition, a partial basement (under the laboratory area) will be provided to include laboratory exhaust hood duct system, mechanical equipment, and some storage and general use area. The office and administration area includes space for management and staff, data management, publication rooms and vital records retention rooms. A Wastewater Treatment Facility is provided to neutralize and treat laboratory wastewater

The 735-A support laboratory operated by the Environmental Monitoring Section of the Environmental Protection Department and the Health Protection Department is 42-years old and is at the end of its life cycle. The 732-11A laboratory, while much newer, has also experienced significant overall deterioration. General deterioration is evident in both buildings due to high volumes of laboratory samples being processed via slow evaporation of concentrated nitric and hydrochloric acids; ventilation system failures have occurred and are documented. These are expected to become prevalent within the next 5 years creating occupational safety and health concerns. Current operations are being performed in facilities that have the following deficiencies: 1) facilities provide inconsistent and unreliable neutralization capabilities for acidic waste water; 2) facilities cannot accommodate large amounts of automated instrumentation and computers; 3) facilities do not allow adequate sample segregation; and 4) there is inadequate space to store and process bioassay samples for the current (and projected) workforce. Existing facility renovation or expansion is not practical nor cost-effective. Renovation would be ineffective since the existing facility does not have adequate space to continue performing the types, quantities, or quality of required analyses. No other suitable space is available on site meeting the requirements and criteria of a laboratory. Renovation would exceed the time and cost to build a new facility.

Sudden and unexpected loss of the site bioassay processing and environmental monitoring capability could occur due to a significant physical failure in building or heating, ventilation, and air conditioning integrity in the existing facility adversely impacting most site support operations. DOE Orders 5400.1, "General Environmental Protection Program"; 5400.5 and pending rule to 10 CFR 834, "Radiation Protection of the Public and the Environment" require the Savannah River Site to conduct programs that quantify the impact of Savannah River Site activities, in any, on the public, environment, and natural resources. Without the Regulatory Monitoring and Bioassay Laboratory, the activities needed to ensure compliance with environmental, Federal, and state requirements would be jeopardized. For example, 13 major facilities risk potential shutdown if air emissions are not analyzed to ensure compliance with the Clean Air Act or effluents to ensure compliance with the Clean Water Act. Failure to comply with Federal or state environmental requirements would leave the site subject to enforcement actions, both civil and criminal. This facility will house the environmental activities requiring fast turnaround quality control and contractor oversight and analysis of samples containing levels of radioactivity that present a potential contamination risk to off-site commercial laboratories. Off-site commercial laboratories are used to analyze samples, verify and validate data for both compliance and noncompliance environmental programs that do not require rapid turnaround. Privatization of environmental activities is not cost-effective and has been eliminated as an option. With regards to worker protection, personnel would be restricted from performing radiological work pending resolution of bioassay assessments. Site work covered by bioassay programs include high-level and low-level waste processing and storage, Defense Waste Processing Facility operations, reactor fuel storage, tritium production and handling, H-Area and F-Area canyons, environmental remediation projects, and other occasional process and incidental site functions. Administration and support of multiple services contracts would be difficult, costly, and error prone. Experience has shown that turnaround times from commercial services are too long to respond effectively to incidents with potential uptakes.

Outsourcing the entire Savannah River Site bioassay analysis to commercial services has been reviewed as an alternative to new construction. The Savannah River Site bioassay laboratory is the largest

processor of actinide bioassay samples in the United States, and it may not be possible to subcontract to a single, existing commercial laboratory. In addition, there is little demand for actinide bioassay sample processing outside the DOE complex; therefore, commercial laboratories have limited capacity and little experience in performing these analyses. If multiple laboratories were utilized, the analytical techniques and statistical treatment of the data could be inconsistent making final result comparisons and dose assignments more difficult to perform and defend. In addition, the Savannah River Site has experienced problems with three different subcontractor laboratories in the past 6 years that performed a small portion of our analyses. Although contracted turnaround times were specified for 3 weeks, results were often not reported for many months (and in some cases greater than 6 months). In addition, it was difficult to obtain the actual hard copy and electronic counting records for quality assurance and dose assessment purposes, and considerable manpower was expended resolving data discrepancies. Historically, many of the DOE sites have had similarly poor service from off-site bioassay laboratories which has resulted in the canceling of contracts and development of on-site capabilities. Problems at Hanford and Sandia within the past decade have resulted in Federal criminal investigations for fraud and mismanagement. Recently, DOE Headquarters issued a communique describing problems that resulted from the Mound Facility using an off-site contract laboratory to perform their bioassay analyses. In previous and current cost assessments of outside laboratories, it has been shown that there is no clear cost advantage to subcontract these services. This along with the increased risk in subcontracting, as mentioned above, has led to a management decision to consolidate all bioassay sample analyses on site.

The gross annual operating cost for this facility is estimated to be $1,800,000. This includes operations, building maintenance, equipment repair and utility costs.

FY 2000 funds will be used for the fixed-price construction and inspection services. Construction activities include: complete building structure, interior finishes, mechanical and electrical systems, and install fixed laboratory equipment.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (7.4% of total estimated cost (TEC)) [b]	2,237	1,780
Design management costs (1.9% of TEC)	580	0
Total, engineering, design, inspection, and administration of construction costs (9.3% of TEC)	2,817	1,780
Construction phase		
Buildings & improvements to land	19,574	17,955
Specialized equipment	2,085	3,330
Other (major utilities/comp items, specialized facilities, etc.)	338	1,800
Inspection, design and project liaison, testing, checkout and acceptance	597	1,865
Construction management (4.1% of TEC)	1,238	550
Total, construction costs	23,832	25,500
Contingencies		
Design phase (0.4% of TEC)	114	196
Construction phase (11.6% of TEC)	3,517	2,804
Total, contingencies (12.0% of TEC)	3,631	3,000
Total, line item costs (TEC)	30,280	30,280

5. Method of Performance

This project will be managed by the Management and Operating contractor. The design and construction shall be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

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[a] The Department of Energy (DOE) February 1997 escalation rates (percent per year) used for this estimate are as follows: FY 1997 2.7%; FY 1998 2.8%; FY 1999 2.6%; FY 2000 2.7%; FY 2001 2.8%. The above estimate includes $844,520 for escalation.

[b] Includes abandoned design and project support cost for Project 97-D-470 (estimated at $1,131,000).

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	1,455	1,400	76	0	0	0	2,931
Construction	0	0	8,570	12,681	6,098	0	27,349
Total facility costs (Federal and Non-Federal)	1,455	1,400	8,646	12,681	6,098	0	30,280
Other project costs [a]							
Conceptual design cost [b]	604	360	0	0	0	0	964
NEPA documentation costs [c]	100	0	0	0	0	0	100
Other project-related costs [d]	316	230	450	400	660	0	2,056
Total other project costs	1,020	590	450	400	660	0	3,120
Total project costs (TPC)	2,475	1,990	9,096	13,081	6,758	0	33,400

[a] Reflects adjustments to overhead costs.

[b] Includes $964,000 spent to prepare Functional Design Criteria, scope of work, preliminary drawings, conceptual estimate, conceptual design report, and a Task Order Proposal Request for architect/engineer services. An estimated $360,000 will be spent to rebaseline the combined projects (revise Functional Criteria and Task Order for architect/engineer services).

[c] Includes $40,000 for National Environmental Policy Act documentation, $50,000 for site characterization, $10,000 to revise existing documentation.

[d] Includes startup, equipment setup/checkout, training, and procedure safety documentation preparation, operational readiness/assessment.

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.) [a]	1,000	230
Annual facility maintenance and repair costs [b]	565	250
Other annual costs [c]	235	540
Total related annual funding *(operating from FY 2001 through FY 2026)*	1,800	1,020

[a] Includes salaries, benefits, overhead staffing, janitorial services and supplies (6 FTE).

[b] Includes repair of equipment; heating, ventilation, and air conditioning; etc. (1.4 FTE).

[c] Includes electric power, fuel, oil and water.

96-D-406, Spent Nuclear Fuels Canister Storage and Stabilization Facility, Richland, Washington (RL-WM01)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- Total project cost increases from $203,114,000 to $233,798,000 due to the following: 1) Canister Storage Building capital equipment not related to construction costs increased for the addition of a sample/weld station in the facility; 2) Canister Storage Building operating costs increased to operate the new sample/weld station; and 3) Cold Vacuum Drying Safety Analysis Report costs increased to modify safety/environmental permit documentation to incorporate modified multiple canister overpacks design, and to address consideration of aluminum hydroxide issues. Some of the increase was offset by cancellation of the Hot Conditioning System. Evolutions of the project safety basis and modification of the multiple canister overpacks design indicate that the Hot Conditioning System is no longer necessary prior to interim storage

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request *(Preliminary Estimate)*	1Q 1996	1Q 1998	2Q 1996	2Q 1998	135,800	180,780
FY 1997 Budget Request *(Preliminary Estimate.)*	"	"	3Q 1996	"	111,416	146,263
FY 1998 Budget Request *(Current Baseline Estimate)*	"	"	2Q 1996	1Q 1999	120,416	157,278
FY 1999 Budget Request *(Current Baseline Estimate)*	"	"	"	2Q 2000	165,397	203,114
FY 2000 Budget Request *(Current Baseline Estimate)*	"	4Q 1998	"	3Q 2000	188,537	233,798

- Electrical Distribution

Existing electrical power supplies for the equipment supporting the double-shell tank primary/annulus ventilation systems and the 244-A/244-S Double Contained Receiver Tank ventilation systems will be upgraded and/or replaced to provide backup power capabilities In addition to providing improved reliability for ventilation systems, these upgrades will allow shutdown of the main switchgear to permit routine preventative maintenance to be performed In addition, the project will upgrade the single-shell tank electrical power systems to support clean/controlled/stable operations. No new safety class power systems are planned as part of this project.

The purpose of Phase II of this project is to improve reliability of safety-related systems, reduce on-site health and safety hazards, reduce the risk of unmonitored releases to the environment, support waste disposal privatization and support the double-shell tank "Manage Tank Waste" functions by restoring the selected Tank Farm facilities and systems. Assessments of the Tank Farms' instrumentation/control, ventilation, waste transfer, and electrical systems, which included physical inspections/condition assessments and engineering analyses to determine compliance with applicable requirements, have identified the need for extensive infrastructure restoration in order to meet the overall Tank Waste Remediation System mission goals and support safe operation and maintenance activities.

Because of their age, many infrastructure systems and components have either exceeded their useful service lives and can be expected to fail in the near-term; have deteriorated beyond repair and must be replaced to ensure continued reliable operation; or operate outside current environmental, health, and safety regulations. Due to the age and obsolescence of the existing equipment, it is often difficult to obtain replacement parts for failed or degraded components. These conditions, coupled with the problems associated with performing maintenance work in contaminated areas, have resulted in high operation and maintenance costs for the Tank Farm facilities.

The FY 2000 appropriation will be used to support continued Phase I construction activities associated with the project management activities.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1996	23,500 [a]	23,500	20,893
1997	16,500	16,500	15,791
1998	10,500 [b]	10,500	12,187
1999	8,697	8,697	10,326
2000	3,845	3,845	3,845
Construction			
1996	19,500	19,500	11,149
1997	44,172	44,172	35,798
1998	11,244 [b]	11,244	26,731
1999	29,983	29,983	31,221
2000	20,596	20,596	20,596

3. Project Description, Justification and Scope

This Major System Acquisition project consists of all the activities necessary to safely stabilize and store approximately 2,100 metric tons of spent N-Reactor fuel currently stored at the 100 K East and West facilities. There are three specific subprojects within this Major System Acquisition as follows:

a. Subproject #01 - Canister Storage Building (W-379)

TEC	Previous	FY 1998	FY 1999	FY 2000	Construction Start - Completion Dates
123,739	84,951	6,118	17,131	15,539	2nd Qtr. FY 1996 - 2nd Qtr. FY 2000

The Canister Storage Building originated from Hanford's canceled waste vitrification plant project. It is being modified to provide long-term, dry storage for spent nuclear fuel removed from the 100 K East and West basins. The fuel will be stored in Multiple Canister Overpacks at the Canister Storage Building. The Canister Storage Building also includes an annex to facilitate final sealing of the Multiple Canister Overpacks.

This facility is envisioned to consist of 2,900 square meters (31,580 square feet), of which approximately 2,310 square meters (23,160 square feet) will be available for storage and 590 square

[a] Reflects appropriation of $42,000,000 with addition of $1,000,000 for FY 1996 internal reprogramming to provide for additional concrete pouring required to maintain higher heat control to store both Spent Nuclear and Tank Waste Remediation System Canisters.

[b] Reflects appropriation of $16,744,000 with addition of $5,000,000 from FY 1998 internal reprogramming to provide for design, procurement, and safety analysis of the Cold Vacuum Drying processing equipment.

meters (6,420 square feet) for loading, handling and service areas. The Nuclear Regulatory Commission Equivalency Requirement Implementation necessitates that the Canister Storage Building be designed and constructed to withstand tornado loadings which has resulted in the design and construction of hardened elements..

Following cold conditioning, fuel will be taken to the vault area where it will be placed, via a Multiple Canister Overpack handling machine, in storage tubes and cooled by natural outside air circulation. The fuel could remain in storage for up to 40 years or until a suitable repository becomes available.

Cost increases experienced in FY 1998 in areas of Title III design, Safeguards and Security System, the structural systems in response to the Nuclear Regulatory Commission equivalency and tornado hardening requirements have required the project to defer work scope from FY 1998 into FY 1999 for project to stay within the FY 1998 funding authorization. The work scope that is being deferred includes the remaining fabrication of the storage tubes, all shield plug fabrication planned for FY 1998 , vaults 2 and 3 insulation concrete, all as built work and all remaining equipment

Currently, spent Hanford N-Reactor fuel is stored in unlined, concrete water-filled basins that are not seismically qualified and are located approximately 93.3 meters (100 yards) from the Columbia River. Any significant seismic event could cause a very serious hazard to the environment and potentially place the health and well being of the surrounding community in jeopardy.

The FY 2000 appropriation will be used to complete Canister Storage Building construction, including the procurement and installation of tube shield plugs and impact absorbers.

Planned conditioning provides facilities and process equipment which increases N-Reactor spent nuclear fuel stability in preparation for dry stockpiling at Hanford's Canister Storage Building.

This conditioning activity now consists of only a cold vacuum drying and process.

b. Subproject #02 - Cold Vacuum Drying Facility (W-441)

TEC	Previous	FY 1998	FY 1999	FY 2000	Construction Start - Completion Dates
58,149	12,604	15,094	21,549	8,902	1st Qtr. FY 1997 - 3rd Qtr. FY 2000

Spent nuclear fuel presently stored in K-basins will be removed from existing storage canisters, washed to minimize loose particulate (sludge), and repacked into Multiple Canister Overpack's prior to removal from the Basins The Multiple Canister Overpack's then will be transferred to a cold vacuum drying facility located in the 100 K Area. Bulk water will be removed and the fuel vacuum dried. Next, the Multiple Canister Overpack's will be transported to the Canister Storage Building, located in the central 200 area, where containers can ~~will~~ be stored up to 40 years.

FY 2000 appropriation will be used for construction closeout.

c. Subproject #03 - Hot Conditioning Facility (W-484)

TEC	Previous	FY 1998	FY 1999	FY 2000	Construction Start - Completion Dates
6,649	6,117	532	0	0	

This subproject has been canceled. Evaluations of project safety basis and modification of the Multiple Canister Overpack design indicate that hot conditioning was no longer necessary prior to interim storage. Budget authorized is being reallocated to the Canister Storage Building and Cold Vacuum Drying.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (17.6% of total estimated cost (TEC)	33,189	28,789
Design management costs (15.4 % of TEC)	28,960	25,401
Total, engineering, design, inspection, and administration of construction costs (33.0% of TEC)	62,149	54,190
Construction phase		
Buildings and improvements to land	82,204	64,701
Specialized equipment	24,168	34,116
Other (major utilities/comp items, specialized facilities, etc.)	0	0
Removal cost less salvage	2,700	2,700
Project management	0	0
Inspection, design and project liaison, testing, checkout and acceptance	0	0
Construction management (5.5% of TEC)	10,299	6,998
Total, construction costs	119,371	108,515
Contingencies		
Design phase (0.5% of TEC)	893	921
Construction phase (3.2% of TEC)	6,124	1,771
Total, contingencies (3.7 % of TEC)	7,017	2,692
Total, line item costs (TEC)	188,537	165,397

5. Method of Performance

Design and inspection shall be performed under a negotiated contract with an architect/engineer. Construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility Cost						
Design	36,684	12,187	10,326	3,845	0	63,042
Construction	46,947	26,731	31,221	20,596	0	125,495
Total facility costs (Federal and Non-Federal)	83,631	38,918	41,547	24,441	0	188,537
Other project costs						
Conceptual design cost	2,970	245	0	0	0	3,215
NEPA documentation costs	1,104	0	0	0	0	1,104
Other project-related costs	16,506	12,921	9,745	1,770	0	40,942
Total other project costs	20,580	13,166	9,745	1,770	0	45,261
Total project costs	104,211	52,084	51,292	26,211	0	233,798

7. Related Annual Funding Requirements

(FY 2001 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.)	2,230	2,743
Annual facility maintenance and repair costs	0	0
Other annual funding	2,230	2,743
Total related annual funding (operating from FY 2001 through FY 2041)	4,460	5,486

96-D-464 Electrical and Utility Systems Upgrade, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho (ID-OIM-106)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

The Idaho Chemical Process Plant has been renamed to better reflect the mission to the Idaho National Technology and Engineering Center.

Increase the number of new standby generators required from one to two. This was driven by a change in the operational requirements for the Coal Fired Steam Generating Facility standby generator to operate as a stand-alone unit. Originally this unit was to be relocated to the Standby Power Facility and paralleled with the other three Idaho Nuclear Technology and Engineering Center generators.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request *(Preliminary Estimate)*	2Q 1996	4Q 1998	3Q 1997	1Q 2002	75,000.[a]	92,800.[b]
FY 1997 Budget Request *(Preliminary Estimate)*	"	"	"	"	62,280	76,690
FY 1998 Budget Request *(Current Estimate)*	"	"	"	"	53,452	67,849
FY 1999 Budget Request *(Current Estimate)*	"	"	"	"	53,452	67,849
FY 2000 Budget Request *(Current Estimate)*	"	"	"	"	53,452	67,849

[a] Preliminary Estimate was based on conceptual design, as submitted in the FY 1996 Construction Project Data Sheet.

[b] Current baseline estimate is the latest baseline which reflects the approved changes to the Title II baseline.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs.[a]
Design			
1996	3,912	3,912.[b]	2,228
1997	3,000	3,000	3,152
1998	2,220	2,220	2,526
1999	279	279	353
2000	1,183	1,183	508
2001	0	0	723
2002	0	0	518
Construction			
1996	600	600	528
1997	7,440	7,440	4,287
1998	12,765	12,765	7,577
1999	11,265	11,265	11,424
2000	10,788	10,788	8,565
2001	0	0	5,851
2002	0	0	3,796
Outyears	0	0	1,416

3. Project Description, Justification and Scope

The Electrical and Utility Systems Upgrade project will upgrade the Idaho National Technology & Engineering Center utility systems by correcting high risk life-safety, health, and environmental deficiencies. Correction of these deficiencies will reduce safety and health risks and provide safe and reliable utilities to support the Idaho Nuclear Technology and Engineering Center mission. The Idaho Nuclear Technology and Engineering Center electrical and utility supply and distribution system provides the infrastructure necessary to support plant operations. This system is outdated, overloaded, and not in compliance with Code of Federal Regulations (CFR) for Occupational Safety and Health Act requirements, DOE orders, or national codes and standards. These factors, combined with plant-wide growth, have over utilized the capacity of the distribution systems and increased the potential health and safety risks associated with long-term use and maintenance of the Idaho Nuclear Technology and Engineering Center utility systems.

The scope of this project includes upgrades to normal and standby power/electrical systems and other utility systems. The system upgrades, improvements, and corrections listed in order of priority, include:

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[a]The amounts in this column have been updated to reflect actual costs through FY-1998 and the most current estimates to complete.

[b]Directed reduction of $440,000 in FY 1996 to meet the uncosted reduction imposed by Congress.

a. installation of a new 13.8 kilovolt-amperes (kVA) high voltage electrical ductbank and manhole system (approximately 15,000 linear feet) to separate high-voltage power circuits from low voltage power, instrumentation, alarm, and communication circuits to correct life-safety and code compliance problems that put maintenance and construction personnel at risk;

b. upgrading, relocating, or new installation of seven 13.8 kVA/13.9 kVA substations and seven 13.8 kVA/480V or 2.4 kVA load centers to eliminate overloaded conditions on existing electrical distribution equipment;

c. upgrading the existing standby power network and control system and installation of two new 2,000 kVA (nominal) diesel generators (a replacement for an old, unreliable unit and one additional new unit) to provide paralleling, synchronizing, load sharing; and load shedding capabilities to provide reliable standby power during normal (commercial) power outages to equipment which provides for containment and control of radioactive and fissile materials, environmental monitoring, security functions, and personnel and property protection;

d. replacement of approximately two hundred 20-40 year old panelboards and associated switchgear in existing buildings that are inadequately rated to safely interrupt and predict against potentially explosive levels of short circuit energy that presents a significant fire hazard;

e. Reconfiguration of electrical service equipment in existing buildings to eliminate multiple electric service entrances that violate code and constitute maintenance and fire-response safety hazards.

The conceptual design has identified major items of scope, and additional deficiencies were found during studies and design efforts. These will be prioritized and completed under this project as funding allows.

The Idaho Nuclear Technology and Engineering Center electrical and utility systems provide the infrastructure services required to support the safe operation and maintenance of the site facilities. Electrical and Utility Systems Upgrade Project feasibility studies and various operating contractor self assessment studies have shown that the electrical and utility systems at the Idaho Nuclear Technology and Engineering Center, because of its age, use, and the rapid growth in utility requirements, are unsafe, unreliable, or violate CFR Occupational Safety and Health Act requirements, DOE orders, DOE Idaho Operations Office A-E Standards, and industry codes and standards, with significant life-safety and health implications. These utility systems are also rapidly approaching severe overload conditions. These high risk deficiencies, along with the system overload, jeopardize the ability of the electrical and utility systems to support the DOE mission at the Idaho Nuclear Technology and Engineering Center to safely receive, inspect, store, and condition for disposal, spent nuclear fuel, and to manage radioactive wastes generated from fuel handling activities while protecting the safety of the workers, the public, and the environment.

Although the mission of the Idaho Nuclear Technology and Engineering Center was changed in 1992 by the DOE from fuel reprocessing to waste management, utility requirements are still projected to increase since the existing facilities, including the inactive fuel reprocessing facilities, will continue to use essentially the same operational quantities of electrical power and other utilities to maintain safe confinement conditions until they are decommissioned. Important equipment such as heating and ventilation fans are still required to operate to maintain pressure boundaries; radiation and environmental monitoring equipment is required to operate to protect the safety and health of the workers; and a

standby power system is required to operate to provide power to important equipment and instrumentation in case of loss of commercial normal power.

Upgrades to the electrical and utility systems thoughout the Idaho Nuclear Technology and Engineering Center complex have been delayed for many years. The last upgrade to the electrical utility infrastructure, the Utility Replacement and Expansion Project (UREP), was completed in FY 1984 at a cost of $10,500,000. The UREP was originally designed to provide the necessary electrical power requirements through 1989. This increased the electrical capacity from 4 MVA to 14 MVA. The Idaho National Engineering and Environmental Laboratory Electrical Upgrade (FY 1993) Project installed a new 26 MVA substation to replace the overloaded 14 MVA substation. The Idaho National Engineering and Environmental Laboratory Electrical Upgrade Project, however, did not provide any new electrical ductbanks or smaller unit substations for distribution of this power to the Idaho Nuclear Technology and Engineering Center facilities.

The Idaho Nuclear Technology and Engineering Center electrical power distribution system is approaching its design capacity. In April 1992, the Idaho Nuclear Technology and Engineering Center power usage reached its highest level (13 MVA, 93 percent of rated 14 MVA capacity) since the plant began operations, even though all fuel reprocessing has been discontinued. Eight existing 13.8 kV feeders in the electrical power distribution system are overloaded or at rated capacity. These feeders are expected to become overloaded as new facilities and equipment loads are added to support the new Idaho Nuclear Technology and Engineering Center missions. The majority of the Idaho Nuclear Technology and Engineering Center electrical manholes presently contain a mixture of high-voltage power, low-voltage power, and low-voltage non-power (communication, alarms, security) circuits without proper separation, which is prohibited by the National Electric Code (NEC) and other safety codes. Several of the existing distribution centers exceed their rated capacities during peak load periods. Several distribution centers have insufficient electrical current interrupting ratings which constitute a potential explosion and fire hazards. In many facilities, power is supplied to multiple service entrances at different locations within a building. This presents a hazard to maintenance and emergency (e.g. fire) response personnel when trying to electrically isolate systems or the facility itself. Many of the service entrance panels or switchgear and internal distribution panels are not adequately protected against short circuit conditions. Many panels, raceways, and conductors are not installed in accordance with safe NEC required practices. Two of the four primary standby power generators have connected loads that exceed their continuous ratings. Such deficiencies represent potential safety hazards to operations and maintenance personnel. Also, many of these 40 year old facilities have deteriorating and obsolete equipment with spare parts no longer available from suppliers.

Upgrades to the Idaho Nuclear Technology and Engineering Center electrical and utility distribution system are essential to: (1) provide for safe operation of site facilities that are key to the Idaho Nuclear Technology and Engineering Center mission, (2) provide a safe work place for employees, (3) minimize risk of property damage as well as damage to the environment, and (4) provide adequate capacity to support the DOE mission.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and final design costs (design drawings and specifications)	7,252	7,252
Design management costs (3.2% of TEC)	1,720	1,720
Project management costs (1.5% of TEC)	794	0
Total, Engineering, design, inspection, and administration of constuction costs (18.3% of TEC)	9,766	8,972
Construction Phase		
Buildings	2,246	0
Specialized equipment	0	2,446
Other (major utilities/comp items, specialized facilities, etc)	22,481	0
Removal cost less salvage	0	22,281
Inspection, design and project liaison, testing, checkout and acceptance	4,154	4,693
Construction management costs (7% of TEC)	3,737	6,776
Project management costs	2,784	0
Total, Construction Costs	35,402	36,196
Contingencies		
Design Phase (< 1.0% of TEC)	242	828
Construction Phase (15.0% of TEC)	8,042	7,456
Total, Contingency (approximately 15.5% of TEC)	8,284	8,284
Total, Line Item costs (TEC)	53,452	53,452

5. Method of Performance

Design will be performed by the operating contractors Facility Engineering (design) Organization. Construction and procurement will be accomplished by fixed price contracts and subcontracts awarded on the basis of competitive bidding to the maximum extent possible. Some time and material construction contracts or force account construction work under operating contractor, direct management, may be utilized for work in areas of radiological or hazardous waste contamination. Title III inspection will be accomplished by the operating contractor.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost.[a]						
Facility Cost						
Design	7,906	353	508	723	518	10,008
Construction	12,392	11,424	8,565	5,851	5,212	43,444
Total Facility Costs (Federal and Non-Federal)	20,298	11,777	9,073	6,574	5,730	53,452
Other Project Costs						
Conceptual design costs	5,395	0	0	0	0	5,395
NEPA documentation costs	83	0	0	0	0	83
Other project-related costs	3,934	2,066	1,205	1,158	556	8,919
Total Other Project Costs	9,412	2,066	1,205	1,158	556	14,397
Total Project Costs (TPC)	29,710	13,843	10,278	7,732	6,286	67,849

7. Related Annual Funding Requirements

(FY 1999 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	800	800
Annual facility maintenance/repair costs	750	750
Total related annual funding (operating from FY 1999 through FY 2038)	1,550	1,550

[a]Revision of costs based on detailed estimate to complete prepared January 24, 1997.

96-D-471, CFC HVAC/Chiller Retrofit, Savannah River Site, Aiken, South Carolina (SR-IN05)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- The total project cost reduced from $58,500,000 to $54,000,000 due to clearer defined estimates as a result of experience gained from execution of subprojects.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request *(Preliminary Estimate)*	1Q 1996	Various	Various	Various	45,000	58,500
FY 1997 Budget Request *(Preliminary Estimate)*	"	"	"	"	"	"
FY 1998 Budget Request *(Title I Baseline)*	"	2Q 2000	3Q 1996	3Q 2002	"	"
FY 1999 Budget Request *(Current Baseline Estimate)*	2Q 1996	3Q 2000	"	"	"	"
FY 2000 Budget Request *(Current Baseline Estimate)*	"	"	"	"	*	54,000

* Current subprojects total $37,628,000; future subprojects have a total estimated cost of $7,372,000.

2. Financial Schedule

Fiscal Year	Appropriations	Obligations	Costs
Design			
1996	700	700	633
1997	850	850	887
1998	1,500	1,500	1,408
1999	800	800	821
2000	770	770	502
2001	0	0	369
2002	0	0	0
Construction			
1996	800	800	66
1997	7,691	7,691	3,095
1998	7,000	7,000	10,127
1999	7,200	7,200	5,968
2000	161	161	2,339
2001	8,342	8,342	5,774
2002	9,186	9,186	13,011

3. Project Description, Justification and Scope

DRIVERS

Current legislation banned chlorofluorcarbon production in December 1995. Continued chlorofluorcarbon use is allowed under strict maintenance and operation regimens. However, the free market pricing mechanisms and DOE policy severely discourage procurement of replacement chlorofluorcarbons. In order to continue operations, the DOE must eventually end its reliance upon chlorofluorcarbons for all cooling applications.

CHLOROFLUORCARBON MISSION

Due to the regulatory requirements, as well as the related impending chlorofluorcarbon shortages, it is imperative that action be taken to preserve EM mission capability by instituting chlorofluorcarbon management for conserving this limited resource pending replacement by non-chlorofluorcarbons, to reduce the continued cost of operation through increased energy efficiency, and to protect the environment from further damage. Ultimately, this program will eliminate the use of ozone-depleting chlorofluorcarbons to ensure compliance with the Environmental Protection Agency Stratospheric Ozone Protection Amendment of the Clean Air Act.

This project provides for the elimination of the use of ozone-depleting chlorofluorcarbons to ensure compliance with the Environmental Protection Agency stratospheric ozone protection amendment of the Clean Air Act at the Savannah River Site. A project of this type cannot be fully detailed in advance due to changing mission requirements, unexpected catastrophic equipment failures, environmental compliance schedules, etc. The subprojects identified are examples of chillers under consideration. This approach is

based upon similar endeavors by other federal agencies, such as the General Services Administration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects.

Refrigerant and cooling requirements are the principal use for ozone-depleting substances (chlorofluorcarbons) at the Savannah River Site (with Halon fire suppression and specialized solvent cleaning operations comprising the remaining usage). The program will eliminate the use of chlorofluorcarbons used in refrigeration and cooling in chillers, direct expansion air conditioners, process coolers, and other refrigeration equipment. (Halon and solvent cleaning usage is already being addressed by site waste minimization activities and the use of non-chlorofluorcarbon based fire protection methodologies.) Small window and wall slot air conditioners and other equipment with refrigerant charges of 10 pounds or less will be replaced when leaks are detected or at the end of their useful life with new equipment utilizing non-chlorofluorcarbon refrigerants, and are not addressed under this program. The ultimate disposal or destruction of chlorofluorcarbon refrigerants is not considered as part of this effort.

The principal chlorofluorcarbon refrigerants found on the Savannah River Site include R-11, R-12, R-113, R-114, R-502, and R-503. Replacement non-chlorofluorcarbon refrigerants/systems are already commercially available, and no development activity is required. However, since some non-chlorofluorcarbon refrigerant replacements are generally of a higher toxicity, additional ventilation and monitoring systems may be required for some of the modified systems to comply with industry standards.

Aging control systems may also require upgrade in order to interface with modern replacement systems. Asbestos and other potential contaminants found during equipment replacement/retrofit may require abatement, containment, or remediation. In modifying existing systems, required utilities and distribution connections and demolition and disposal may be necessary for non-salvageable components and systems.

The following legislative actions have been considered in the formulation of the Chlorofluorcarbon Heating, Ventilation, and Air Conditioning Chiller Retrofit Project:

- Title VI of the Clean Air Act, as amended, which mandates a curtailment of ozone-depleting substance production.
- Title III of the Clean Air Act, as amended, waives the Government's sovereign immunity under Section 302(e) and subjects "...any agency, department, or instrumentality of the United States and any officer, agent, or employee thereof" to the provisions of the Act. The Federal Enforcement provisions outlined in Section 113 include civil and criminal penalties for knowingly violating the provisions.
- The Refrigerant Recycling Rule as given in 58 FR 28660 allows a maximum leakage of 15 percent per annum of a refrigerant system's charge of Chlorofluorcarbon working fluid.
- Title 40 of the Federal Regulations addresses air pollution in general. The Environmental Protection Agency final rule (40 CFR 82, "Production and Consumption Controls," 12/10/93) accelerates the phase-out of Class I substances.

- Executive Order 12856 of 1993 addresses federal compliance with right-to-know laws and pollution prevention requirements, and stipulates 50 percent reduction in leakage/emission of Emergency Planning and Community Right-to-Know Act chemicals by December 31, 1991, including some Chlorofluorcarbons.
- The National Pollution Prevention Act of 1990.
- Executive Order 12843 addresses procurement policies for ozone-depleting substances.

The Chlorofluorocarbon Heating, Ventilation, and Air Conditioning-Chiller Retrofit Project has been planned to provide a consistent prioritized method for the application of scarce capital resources to address the replacement or conversion of equipment reliant upon chlorofluorcarbon refrigerants. The project will utilize a consistent strategy for assessment of requirements to maintain credibility, and a funding approach based on technical and budget priorities to systematically reduce risk and insult to the ozone and environment while protecting worker and public safety and maintaining critical program activities.

The subprojects identified in this section (new starts) represent the highest priority efforts given the current equipment conditions, site mission status, environmental and/or regulatory compliance information, etc. However, site requirements, unexpected regulatory or safety driven issues, or equipment failures may result in a re-prioritization of the activities proposed under this project. This reprioritization may result in subproject(s) being substituted for those identified as New Starts. Subproject additions/substitution/deletions will be controlled and tracked through the Baseline Change Control process. Subproject changes will be discretely identified once approved through the Baseline Change Control process.

The following is a brief description and justification for each of the chiller subprojects proposed for.

FY 2000 Proposed Projects: (New Starts)

Subproject 06: S Area

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
8,250	0	0	0	500	7,750	2nd Qtr. FY 2000 - 2nd Qtr. FY 2002

Replace six chillers with a total capacity of 2,540 tons.

FY 1999 Projects:

Subproject 13: New Special Recovery/HB Line Areas

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
3,300	0	0	463	431	2,406	2nd Qtr. FY 2000 - 4th Qtr. FY 2001

Replace two chillers in HB Line and one in New Special Recovery Facility.

FY 1998 Projects:

Subproject 07: 299-H

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
1,063	700	363	0	0	0	4th Qtr. FY 1998 - 1st Qtr. FY 1999

Replace one 400 ton chiller.

Subproject 08: 235-F

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
2,638	364	900	1,374	0	0	1st Qtr. FY 1999 - 4th Qtr. FY 1999

Replace two chillers with a total capacity of 350 tons.

Subproject 12: Tritium, Phase III

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
1,900	0	300	1,600	0	0	1st Qtr. FY 1999 - 3rd Qtr. FY 1999

Convert two 658-ton chillers to a non-chlorofluorcarbon refrigerant.

FY 1997 Projects:

Subproject 04: F-Canyon / Analytical Laboratories

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
9,172	3,500	1,543	4,129	0	0	1st Qtr. FY 1998 - 3rd Qtr. FY 1999

Replace ten chillers with a total capacity of 3,720 tons. Consolidation of chillers into a central chiller plant will be considered.

Subproject 05: H-Canyon

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
2,771	800	1,971	0	0	0	1st Qtr. FY 1998 - 4th Qtr. FY 1998

Replace two 350-ton chillers in 221-H. Replace one 10-ton chiller and convert one 160-ton chiller in 221-HBL to a non-chlorofluorcarbon refrigerant.

FY 1996 Projects:

Subproject 02: Tritium, Phase I

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
677	677	0	0	0	0	2nd Qtr. FY 1996 - 4th Qtr. FY 1996

Replacement of one 445-ton chiller in Building 234-H which is currently inoperable.

Subproject 03: Tritium, Phase II

TEC	Previous	FY 1998	FY 1999	FY 2000	Outyears	Construction Start - Completion Dates
7,857	4,000	3,423	434	0	0	2nd Qtr. FY 1997 - 2nd Qtr. FY 1999

Consolidate eight chillers into a central four chiller plant providing 1,350 tons of cooling.

Additional New Start projects beyond FY 2000 have a total estimated cost of $7,372,000.

EXECUTION CONSIDERATIONS

The two principal options for addressing existing Chlorofluorcarbon dependent chiller/heating, ventilation, and air conditioning systems are: 1) conversion (retrofits) and 2) replacement.

- *Conversion* (retrofit) of the equipment to use alternative non-ozone depleting refrigerants such as hydrochlorofluorocarbon or hydrofluorocarbon. Conversion needs to consider the impact on the materials utilized in chiller construction (e.g., corrosive effect of alternative refrigerants upon chiller seals) and the impact on equipment performance.
- *Replacement* of the equipment with new non-chlorofluorcarbon dependent equipment.

Consideration/evaluation of the conversion versus replacement decision include:

- Age of the chillers;
- Performance of the existing chillers; machine capability; relative efficiency, maintainability, and reliability,
- Life cycle cost analyses;
- Spare part availability;
- Current system capacity margin and future growth requirements; system impact on the site and facility mission and mission urgency;
- Accessibility issues and structural modifications that may be necessary to accommodate a replacement.

In summary, as equipment approaches the end of its useful life, replacement may appear to be an obvious choice However, the decision for replacement will not be made until installation costs have been adequately addressed (i.e., removal of existing equipment, accessibility for the placement of new equipment, equipment tie-in points, and new support equipment). The final decision to convert or replace can only be made following a case-by-case engineering evaluation which considers all of the above factors. Private industry involvement and practices will be employed to the greatest extent possible

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (5.5% of total estimated cost (TEC))	2,489	2,192
Design management costs (2.6% of TEC)	1,192	0
Total, engineering, design, inspection, and administration of construction costs (8.2% of TEC)	3,681	2,192
Construction phase		
Other (major utilities/comp items, specialized facilities, etc.)	27,407	32,263
Inspection, design and project liaison, testing, checkout and acceptance	898	1,428
Construction management (8.7% of TEC)	3,897	0
Total, construction costs	32,202	33,691
Contingencies		
Design phase (2.1% of TEC)	939	548
Construction phase (18.2% of TEC)	8,178	8,569
Total, contingencies (20.3% of TEC)	9,117	9,117
Total, line item costs (TEC)	45,000	45,000

5. Method of Performance

Installation of replacement equipment and system conversions (retrofits) will be performed to the greatest extent feasible through competitive solicitations or competitively selected service contracts. Procurement will be accomplished to the maximum extent practical through competitively bid solicitations and contracts.

[a] The DOE escalation rates (percent per year) used for this estimate are as follows: FY 1996-3.2%; FY 1997-2.7%; FY 1998-2.8%; FY 1999-3.0%; FY 2000-3.0%; FY 2001-3.0%. The above estimate includes $2,433,257 for escalation.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	1,520	1,408	821	502	369	0	4,620
Construction	3,161	10,127	5,968	2,339	5,774	13,011	40,380
Total facility costs (Federal and Non-Federal) [a]	4,681	11,535	6,789	2,841	6,143	13,011	45,000
Other project costs							
Other project-related costs	3,128	1,710	1,185	1,264	910	803	9,000
Total other project costs	3,128	1,710	1,185	1,264	910	803	9,000
Total project costs (TPC)	7,809	13,245	7,974	4,105	7,053	13,814	54,000

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate [b]	Previous Estimate
Annual facility operating costs (staff, utilities, etc.)	0	0
Annual facility maintenance and repair costs	0	1,953
Programmatic effort related to facility	0	0
Other annual costs	0	1,421
Total related annual funding *(operating from FY 2000 through FY 2023)*	0	3,374

[a] The line item TEC is $45,000 which includes design, procurement, and construction.

[b] Replacement of the chillers will result in less maintenance and energy costs of approximately $3,400,000.

86-D-103, Decontamination and Waste Treatment Facility, Livermore, California (OK-027)

(Changes from FY 1999 Congressional Budget Request and denoted with a vertical line [|] in the left margin)

Significant Changes

Update project completion date to reflect latest approved baseline change.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1986 Budget Request (*Preliminary Estimate*)	2Q 1986	N/A	3Q 1987	1Q 1989	11,600	12,369
FY 1987 Budget Request (*Preliminary Estimate*)	1Q 1986	"	2Q 1987	1Q 1990	36,400	37,169
FY 1988 Budget Request (*Preliminary Estimate*)	3Q 1986	"	4Q 1987	3Q 1991	40,900	41,669
FY 1989 Budget Request (*Preliminary Estimate*)	"	3Q 1990	1Q 1988	"	41,300	42,069
FY 1990 Budget Request (*Preliminary Estimate*)	"	On Hold	"	"	41,300	42,069
FY 1991 Budget Request (*Preliminary Estimate*)	"	"	"	1Q 1993	41,300	41,300
FY 1992 Budget Request (*Preliminary Estimate*)	"	"	2Q 1988	2Q 1996	59,300	60,069
FY 1993 Budget Request (*Preliminary Estimate*)	"	"	"	2Q 1999	59,300	60,069
FY 1994 Budget Request (*Preliminary Estimate*)	"	3Q 1998	"	4Q 2000	59,300	60,069
FY 1995 Budget Request (*Preliminary Estimate*)	3Q 1994.*	"	"	4Q 2000	59,300	60,069
FY 1996 Budget Request (*Title I*)	"	"	"	1Q 2000	75,227	76,119
FY 1997 Budget Request (*Title I*)	"	"	"	"	75,227	76,119
FY 1999 Budget Request (*Current Estimate*)	"	"	"	4Q 2002	62,362	63,131

* BCP issued to rebaseline project for restart. These dates are represented in the rebaseline document.

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request (*Current Request*)	3Q 1994	3Q 1998	2Q 1998	2Q 2003	62,362	63,131

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
Prior Years	3,756 [a]	3,756	3,756
1998	1,116.[b]	1,116	1,116
1999	585	585	585
2000	28.[c]	28	28
2001	0	0	0
2002	0	0	0
2003	0	0	0
Construction			
Prior Years	38,905	38,905	21,470.[d]
1998	10,134	10,134	10,872
1999	3,127 [c]	3,127	15,563
2000	1,972	1,972	6,355
2001	2,000	2,000	2,114
2002	739	739	426
2003	0	0	77

3. Project Description, Justification and Scope

This project has experienced a number of scope changes since its inception. The original scope in FY 1986 consisted of a Liquid Waste Processing Facility, a Decontamination Facility, an operational Support Building, mechanical/electrical utility upgrades, and site preparation. The project was located in the southeast corner of the laboratory and the Total Project Cost was $11,700,000. Between 1987 and 1990, the location of the site was changed to the northeast corner of the laboratory, due to the potential for

[a] $25,000 approved FY 1990 reprogramming for the Waste Isolation Pilot Plant· FY 1992 General Reduction of $2,060,000, and prior year funds used for FY 1994/FY 1996 General Reduction

[b] Reduction of $500,000 of current year funds in FY 1997

[c] Prior year funds used as an offset for FY 1999 uncosted reduction, $1,040,000. Original appropriation was $4,752,000.

[d] Includes other project costs

seismic activity. The scope was increased to include a Solid Waste Processing Building, an incinerator and burn pan, a boiler and chiller plant, a Reactive Materials Building, and a Storage Building The Total Project Cost increased to $40,900,000. In 1990, the Lawrence Livermore National Laboratory Director adopted the recommendation of an internal laboratory panel to delete the incinerator and burn pan from the scope of the project due to public opposition. In 1993, a new baseline was approved which deleted the incinerator and the decontamination building, and added the Real Time Radiography Building, the Transuranic handling facility, and the upgrade of Building 494 for mixed waste process development and engineering, increasing the Total Project Cost to $74,769,000. In 1993, DOE Oakland did an Integrated Waste Management Study which evaluated the waste management needs of Lawrence Livermore National Laboratory and concluded that the scope of the Decontamination and Waste Treatment Facility did not meet these needs. This resulted in the Alternative Design Review, which further evaluated the laboratory's waste management needs and compared various options for meeting these needs. The Baseline Change Proposal approved in December 1996, is based on deleting the portion of scope associated with the Mixed Waste Management Facility. In addition, Resource Conservation and Recovery Act closure of the old processing areas will be required within 180 days of moving to the new facility. This revised baseline represents the final path forward for the design and construction of the facility.

The scope is described in the Construction Project Data Sheet which follows.

This project will enhance, improve, and expand hazardous waste and mixed waste management at the Laboratory through the construction of approximately 79,100 square feet of new, state-of-the-art facilities for decontamination and waste treatment processes and 5,090 square feet of modifications to an existing building. This project will provide new, centralized and integrated facilities for Hazardous Waste Management operations that will meet the requirements for Low Hazards Category 3 Facility. The project will include the design and construction of new buildings on a nine-acre site located in the northeast sector of the Laboratory; it will share the site with existing Hazardous Waste Management Building 693.

It is anticipated that design and construction will be accomplished in seven phases to meet project schedule and funding constraints. A brief description of project scope by phase follows.

Phase 1 - Site improvements. This phase includes debris removal, excavation, grading, trenching, electrical service, underground utilities, partial paving, curb and gutter, and sidewalks.

Phase 2 - Mixed Waste Management Facility. This phase has been deleted.

Phase 3A - Decontamination and Waste Treatment Facility. This phase consists of construction of the Truck Bay, Solid Waste Processing Building, Chemical Exchange Warehouse, High Curie Waste Storage, Radwaste Storage Building, and modifications to existing Building 280.

Phase 3B - Decontamination and Waste Treatment Facility. This phase consists of construction of the Liquid Waste Processing Building, Reactive Materials Building and Classified Waste Storage Building.

Phase 4 - Decontamination and Waste Treatment Facility. This phase consists of construction of the Operational Support Building.

Phase 5 - Final site improvements. This phase consists of all remaining site work for the project, such as final grading, paving, parking facility, fencing, landscaping, and exterior lighting.

Phase 6 - Resource Conservation and Recovery Act Closure of existing facilities.

The proposed Decontamination and Waste Treatment Facility at Lawrence Livermore National Laboratory will continue to meet the goals of Lawrence Livermore National Laboratory's waste management program while significantly enhancing Lawrence Livermore National Laboratory's waste management capabilities. Enhanced capabilities provided by the revised scope include the following: repackaging of radioactive, mixed and transuranic wastes, decontamination and size reduction, treatment of mixed, reactive, sewer diversion wastes and proper storage of radioactive, mixed, hazardous, and high-curie waste.

- Designing mitigative and preventive features to meet current requirements of DOE Orders and Lawrence Livermore National Laboratory Health and Safety standards in accordance with the hazardous classification.
- Consolidating the liquid waste operation into a centralized hazardous waste management facility which will optimize manpower and facility utilization.

In 1990, the Resource Conservation and Recovery Act land disposal restrictions became effective, prohibiting the land disposal of untreated hazardous and mixed radioactive wastes. DOE disposal facilities (such as the Nevada Test Site) that previously accepted untreated mixed waste will no longer be permitted to accept such wastes. The proposed Decontamination and Waste Treatment Facility will be capable of treating a portion of land disposal restricted mixed and hazardous wastes.

a. Liquid Waste Processing Building

The existing Liquid Waste Facility (514) is an old engine test building constructed in the 1940's for use by the U.S. Navy. The facility has been modified to process radioactive and hazardous liquid wastes through a single process line. Some of the present equipment and much of the present piping is deteriorated and requires expensive repair to maintain operations. The present location, which is separated from the other Hazardous Waste Management facilities, has insufficient space to allow for the additional expansion required to provide complying facilities. Due to the limited treatment technology employed, and excessive volume of end product that is produced it is difficult to solidify for disposal. The present radioactive and mixed wastes solidification building does not meet the ventilation, contamination, and confinement requirements of DOE Order 6430.1A. Continuing maintenance and improvement has not alleviated the situation. In addition to the liquid waste processing systems, the new building will house the analytical laboratory, maintenance shop, and a silver recovery facility. The advantages of the facility include:

- Siting the new facility in a location which meets the seismic requirement of Resource Conservation and Recovery Act and the State.
- Providing sufficient treatment to assure meeting the new restrictive discharge limits established by regulators.
- Providing more efficient technology to minimize disposal volume to comply with environmental regulations and DOE Orders.
- Providing close capture ventilation and spill containment systems to comply with the environmental regulations which limit air emissions and prohibit liquid discharges to the environment.

b. Waste Receiving, Classification, and Solid Waste Processing Building

Receiving and Classification Area

Receiving and classification is currently being performed in an open shed with limited space resulting in many containers being stored outdoors and the remainder receiving only minimal weather protection. There are no facilities to properly segregate incompatible wastes, and nothing to contain spills or container ruptures as required by Resource Conservation and Recovery Act, California hazardous wastes regulations, and DOE Orders. An open area is still used. Although spills are contained, they would mix with rainwater. The new facility will provide the space necessary to receive, segregate, and store chemical and radioactive containers of all types and sizes until the proper analysis and classification is completed and a determination made on the treatment, packaging, and shipping methods required to properly prepare them for ultimate safe disposal. A work station will be included in the facility for maintaining incoming and outgoing shipping documentation and inputting data to the central computer through a terminal.

Solid Waste Processing Area

Radioactive solid waste processing consists of packaging and compacting of low-level waste and transuranic waste and is presently done in the Building 612, Dry Waste Facility which is seismically deficient and cannot meet the As Low As Reasonably Achievable requirements of DOE Order 6430.1A. Specific advantages of the new facility are:

- Meeting the Uniform Building Code and Lawrence Livermore National Laboratory seismic requirements.
- Increases processing capability with safer handling and control.
- Provides transuranic size reduction, packaging, and container inspection capability.
- Designing mitigative and preventive features to meet current requirements of DOE Orders and Lawrence Livermore National Laboratory Health and Safety standards in accordance with the hazard classification.

c. Storage Building

Radioactive Waste Storage Area

Radioactive and mixed wastes stored at the present Hazardous Waste Management site are stored outside exposing them to the weather. The radioactive waste storage area is required at the new Decontamination and Waste Treatment Facility in order to provide safe and compliant storage of those materials.

Chemical Exchange Warehouse

The Chemical Exchange Warehouse will house the cost cutting program which allows for programmatic chemical users to share chemicals and not continue to purchase chemicals that are not needed, i.e., if an experiment only requires a small quantity of a chemical, they may find the chemical at the Chemical Exchange Warehouse and avoid purchasing a new container full. Excess chemicals from a program are turned into the Chemical Exchange Warehouse for reassignment as necessary.

Building 280 Modifications

Building 280 will house the transuranic, transuranic mixed, and high curie waste.

d. Operational Support Building

This facility will provide the following:

- Central support for the four major operational functions; waste receiving and shipping, mixed aqueous waste treatment, solid waste processing and storage.
- Bring together the supervisory, administrative, technical support, and operational personnel currently housed in dispersed locations.
- Provide a training room to meet the requirements of 40 CFR 264.16 for training of personnel in handling hazardous waste.

e. Standby Generator

The standby generator is necessary to supply standby electrical power to critical facilities and operations in the Decontamination and Waste Treatment Facility during and following an earthquake. It must be invulnerable to damage to assure sustained electric power to equipment in the moderate hazard facilities which must continue to operate, i.e., ventilation, fire protection, and alarm systems, and also allow the safe shut-down of critical hazardous waste processing systems.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and final design costs (5.4% of total estimated cost (TEC))	3,391	3,063
Design management costs (2.4% of TEC)	1,489	1,481
Total, Engineering, design, inspection, and administration of construction costs (7.8% of TEC	4,880	4,544
Construction Phase		
Buildings and improvements to land	35,021	33,751
Specialized equipment	4,775	4,775
Inspection, design and project liaison, testing, checkout and acceptance	2,539	1,740
Construction management (3.5% of TEC)	2,198	2,107
Total, Construction costs	44,533	42,373
Contingencies		
Design phase (1.0% of TEC)	605	918
Construction phase (5.5% of TEC)	3,428	5,611
Total, Contingencies	4,033	6,529
Unrecoverable Costs		
Design	5,356	5,356
Project Management	1,393	1,393
Permit	2,167	2,167
Total, Unrecoverable Costs	8,916	8,916
Total, line item costs (TEC)	62,362	62,362

5. Method of Performance

Current estimate based on re-baseline cost estimate. Escalation is applied according to Lawrence Livermore National Laboratory Cost Estimating Procedures and Lawrence Livermore National Laboratory approved escalation rates.

Contracting arrangements are as follows:

Design will be on the basis of a negotiated architect-engineer contract. Major equipment requiring long-lead time will be purchased by Lawrence Livermore National Laboratory early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Minor architect-engineering work and activation will be performed by Lawrence Livermore National Laboratory forces.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost							
Facility Cost							
Design	3,756	1,116	585	28	0	0	5,485
Construction	12,554	6,776	17,563	8,215	2,114	739	47,961
Inventories/Unrecoverable	8,916	0	0	0	0	0	8,916
Total, Facility Costs (Federal and Non-Federal)	25,226	7,892	18,148	8,243	2,114	739	62,362
Other project costs							
Conceptual design cost.[a]	315	0	0	0	0	0	315
Other project-related costs.[b]	454	0	0	0	0	0	454
Total, Other project cost	769	0	0	0	0	0	769
Total, Project Costs (TPC)	25,995	7,892	18,148	8,243	2,114	739	63,131

[a]FY 1992 General Reduction of $2,060,000

[b]Funding of $454,000 in the classification represents Research and Development costs required to develop project and seismic criteria.

7. Related Annual Funding Requirements

	(FY 2000 dollars in thousands)	
	Current Estimate	Previous Estimate
Annual facility operating costs.[a]	1,155	1,155
Annual facility maintenance/repair costs.[b]	1,026	1,026
Programmatic operating expenses directly related to the facility.[c]	4,820	4,820
Capital equipment not related to construction but related to the programmatic effort in the facility.[d]	400	400
GPP or other construction related to the programmatic effort in the facility	200	200
Total Related Annual Funding	7,601	7,601
Total Operating costs (Operating from FY 2000 through FY 2020)	152,020	152,020

[a]Based on projected space recharge of $10.00 per square foot - operating costs of the facility in 2000 are estimated to be $1,155,000 per year including escalation. The funds for these costs are a normal part of the past and current programs.

[b]Labor is estimated for 7.6 Full Time Equivalents to support the operations of approximately $135,000 per year for a total annual cost of $1,026,000. The funds for these personnel are a normal part of the past and current programs.

[c]This estimate is for 30 Hazardous Waste Management operating and support personnel at $4,050,000 in FY 2000, and for an estimated annual cost of $770,000 for chemicals, drums, pumps, spare parts, equipment replacement, etc. The operating funds for these personnel are a normal part of the past and current programs

[d]This is an average annual estimate which includes both the small items needed for continuous operation of the facility and the occasional large item (over $200,000) which cannot be described at this time, but can be predicted as needed to maintain technical excellence in efforts conducted in the facility ($400,000)

00-EXP, Laboratory Facilities Roof and Shielded Area Restoration, 773-A & 772-F, Savannah River Site, Aiken, South Carolina (SR-IN13)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	2Q 2000	4Q 2000	3Q 2000	2Q 2002	14,660 [a]	15,700 [a]

2. Financial Schedule (Operating Expense Funded)

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
2000	734	734	360
2001	450	450	824
Construction			
2000	2,040	2,040	2,040
2001	8,516	8,516	8,516
2002	2,920	2,920	2,920

3. Project Description, Justification and Scope

The main objective of this operating expense funded project is the decontamination of the existing Central Laboratory, Building 772-F, and the Savannah River Technology Center's main laboratory, Building 773-A, at the Savannah River Site, in order that operational and maintenance requirements can be accomplished in a cost-effective manner.

This project has two primary objectives. The first objective is to decontaminate the 772-F Service Floor Shielded Areas, which are high radiation and contamination areas, to a level that would allow operational

[a]The estimate is based on a completed Conceptual Design Report estimate.

and maintenance personnel to access the area as a respirator class area for routine work. Also, it will decontaminate the fan and filter room areas to the contamination level of a Radiological Buffer Area so that frequent access required for maintenance and surveillance can be easily accomplished. The shielded areas of 772-F became contaminated due to corrosion of the high activity drain lines from laboratory modules. A completed project (S-4383) replaced the leaking drain lines with fully jacketed drain lines, with leak detection, to prevent additional contamination from entering the shielded areas. The Building 772-F fan and filter room areas on the service floor have become contaminated during equipment replacement and maintenance in the area. Procedural changes are now in place to prevent these areas from becoming recontaminated. Reducing the levels of radiation and contamination is necessary to provide radiological working conditions in areas such that they may be utilized for their intended purpose, and to decrease the overall radiation exposure to personnel performing tasks in these areas. Personnel performing tasks in respirators will be more productive than when using the presently employed breathing air system. This will result in reduced costs associated with maintaining appropriate radiological controls.

The second objective of the operating expense funded project is to decontaminate the 773-A roof and equipment on the roof and replace the roofing system on portions of Building 773-A such that it may be utilized for its intended purpose. The new roofing system may be similar/equivalent to the original roofing system on 773-A. The Savannah River Technology Center's laboratory 773-A building, which is the main Savannah River Technology Center laboratory building, has been in operation since the early 1950's. Over the years, portions of the roof have become radioactively contaminated due to stack releases and exhaust leaks from process systems. The roof has deteriorated from wear and weather which has resulted in rain water leaks into the building. This project will include decontamination of the roof and equipment on the roof, the removal of existing roofing system, the installation of a cleaned sealed replacement roof, and the replacement and/or repair of associated ventilation equipment. The project will include the necessary work to remove or fix in place transferable contamination that could become airborne or become assimilated into the roof water run off. Systems and procedures are now in place to mitigate the chances of future stack releases and other operational concerns that would recontaminate the roof areas. The area to be covered with the new roofing system per this project is about 60 percent of the roof area of 773-A. This is about 150,000 square feet and based on recent costs for replacement of a clean roof the cost alone would be about $2,400,000.

However, since the roof is deteriorated, contamination exists on portions of the roof, and decontamination of the roof is necessary for operational reasons; the roof will be replaced as part of this project. No roof structural members will need replacing with this project. There will also be incidental repairs to ventilation equipment in order to prevent future contamination of the roof. This will involve replacement of leaking flexible seals with new units of the same type and will add secondary shields on roof duct work to contain leaks in this area. This is a minor part of the project and is not considered a betterment to the ventilation system since repairs are needed for the ventilation system to serve its designated purpose.

Improved radiological working conditions and lower overall radiation exposure to personnel performing tasks on the roof will result from the reduction in levels of radiation and contamination. In addition, the leaking rainwater cleanups and subsequent impacts on laboratory operations will be eliminated as will the potential for the spread of contamination to clean laboratories and the environment.

f funding for this project is not received in FY 2000, the roof areas of 773-A will continue to deteriorate nd increase the potential for the spread of contamination, as well as continue to have a negative impact n laboratory missions, operations, and maintenance. The continuing exposure of personnel to high levels f radiation and contamination for normal maintenance and surveillance activities will also continue to ave a negative impact to personnel safety in both 772-F and 773-A.

he execution of this project will improve present physical working conditions in the Savannah River echnology Center's main laboratory building and in the Analytical Labs 772-F building. These improved workin conditions will put these facilities in a better position to support current and future short- and long-te lab missions.

FY 200 funding will be used to obtain a fixed-price architect/engineer and to initiate and award the subcom icts for the construction phase of the project.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
n p ase		
ng eering design and inspection (5.3% of total estimated cost (TEC))	772	NA
roj t management (2.6% of TEC)	412	NA
en neering, design, inspection and administration of construction costs (8.1% of TEC)	1,184	NA
uc on phase		
ilc ngs	10,316	NA
on ruction management costs (4.9% of TEC)	720	NA
co truction costs	11,036	
ge ies		
on uction phase (16.6% of TEC)	2,440	NA
co ngencies (16.6% of TEC)	2,440	NA
in tem costs (TEC)	14,660	NA

5. Method of Performance

es n, procurement, and construction will be performed by fixed-price subcontractors awarded on si f competitive bidding.

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[a] he OE escalation rates (% per year) used for this estimate are as follows: FY 1999 through FY 2001 are 4.0 t. e above estimate includes $1,907,000 for escalation.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	0	0	0	360	824	0	1,184
Construction	0	0	0	2,040	8,516	2,920	13,476
Total, facility costs (Federal and Non-Federal)	0	0	0	2,400	9,340	2,920	14,660
Other project costs							
Conceptual design cost	300	43	30	0	0	0	373
Other project-related costs [a]	0	0	0	160	370	137	667
Total other project costs	300	43	30	160	370	137	1,040
Total project costs (TPC)	300	43	30	2,560	9,710	3,057	15,700

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	NA	NA
Annual facility maintenance and repair costs	NA	NA
Programmatic operating expenses directly related to the facility	NA	NA
Capital equipment not related to construction but related to the programmatic effort in the facility	NA	NA
GPP or other construction related to the programmatic effort in the facility	NA	NA
Utility costs	NA	NA
Other costs	NA	NA
Total related annual funding	NA	NA

[a] Other project costs include Radiological Control Operations support for area surveys. It also includes support for work package processing, waste characterization, facility design reviews, temporary modification design and control, and support facility activities related to the project. Startup costs and management of the other project costs is also included in this estimate.

96-EXP, Americium/Curium Vitrification, Savannah River Site, South Carolina (SR-NM01)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

- Detailed design and construction activities on portions of the project have been deferred to allow additional time for the process and equipment development It is estimated that the project will undergo a rebaselining in the 3rd Quarter FY 1999 The rebaselining will provide definitive impacts to the baselines.
- The significant changes to the cost and schedule baselines are a result of the deferment of design and construction activities and additional research and development effort due to the difficulties in the adaptation of a commercial melter to produce stable glass with highly radioactive aqueous feed.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1996 Budget Request *(Preliminary Estimate)*	2Q 1996	2Q 1997			26,000	36,700
FY 1997 Budget Request *(Preliminary Estimate)*	"	"	3Q 1996	2Q 1998	29,230	40,500
FY 1998 Budget Request *(Preliminary Estimate)*	"	"	"	2Q 1999	"	"
FY 1999 Budget Request *(Title I Baseline)*	"	3Q 1998	"	2Q 2000	34,044	60,278
FY 2000 Budget Request *(Current Baseline Estimate).**	"	2Q 2000	"	2Q 2001	40,349	80,021

* The design and construction activities on portions of the project have been deferred pending further research and development work. The cost and schedule estimates are not definitive and will be confirmed with a planned rebaselining in the 3rd Quarter FY 1999.

2. Financial Schedule (Operating Expense Funded)

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1996	5,483	5,483	5,483
1997	4,007	4,007	4,007
1998	1,348	1,348	1,348
1999	2,500	2,500	2,500
2000	3,929	3,929	3,929
2001	373	373	373
Construction			
1996	872	872	872
1997	1,633	1,633	1,633
1998	988	988	988
1999	1,201	1,201	1,201
2000	8,011	8,011	8,011
2001	10,004	10,004	10,004

3. Project Description, Justification and Scope

This project proposes the vitrification of the F-Canyon americium/curium solutions into borosilicate glass via a melter to be installed in the Multi-Purpose Processing Facility of the 221 F-Canyon. This project would provide for the development and design of the vitrification process, the design of the associated building infrastructure interfaces and the construction and installation of the equipment. This project would provide for the refurbishing of the existing Multi-Purpose Processing Facility to accommodate the new equipment.

Approximately 15,000 liters of solution containing the valuable isotopes 243 Am and 244 Cm have been accumulated in the 221 F-facility from recovery campaigns that began in the mid-1970s. These solutions have been identified in several documents as a vulnerability and, as such, require stabilization. These documents include the Defense Nuclear Facilities Safety Board Recommendation 94-1 and the Plutonium Environment, Safety and Health Vulnerability Assessment Report. There is no reasonable method to transport this material in solution from outside of F-Canyon. Due to intense radiation source of the material, a heavily shielded, remotely operated facility is required for handling and processing. There is no existing operable process to convert this solution to a solid form for safe storage or transport to the National Heavy Element and Advanced Neutron Sources Programs at the Oak Ridge National Laboratory. An analysis of several alternatives has resulted in this project to develop the process to stabilize the solutions by vitrification into a glass form. The facility most suitable for installing vitrification equipment to stabilize this solution is the Multi-Purpose Processing Facility.

An extensive research and development program was implemented at the Savannah River Site to stabilize the americium/curium solution as DOE had no existing stabilization capability. During the development process, the initial melter concept was determined unsuitable. Problems due to geometry (heat distribution) and operations characteristics (continuous feed/pour and offgas generation) were

encountered. Since January 1998, development work has focused on a new melter concept (cylindrical, batch feed/pour). This new concept has been successfully demonstrated on surrogate material resulting in project design recommencement. Based upon the new design a total project rebaseline (cost and schedule) will be complete in June 1999.

The FY 2000 funds will be used to continue design for this project, procure materials, and continue with construction.

4. Details of Cost Estimate.*

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (29.8% of total estimated cost (TEC))	12,024	9,186
Design management costs (4.4% of TEC)	1,775	1,174
Total, engineering, design, inspection, and administration of construction costs (34.2% of TEC)	13,799	10,360
Construction phase		
Other (major utilities/comp items, specialized facilities, etc.)	12,464	0
Removal costs less salvage	0	12,640
Inspection, design and project liaison, testing, checkout and acceptance	2,325	0
Construction management (1.8% of TEC)	746	0
Total, construction costs	15,535	12,640
Contingencies		
Design phase (9.5% of TEC)	3,841	7,400
Construction phase (17.8% of TEC)	7,174	3,644
Total, contingencies (27.3% of TEC)	11,015	11,044
Total, line item costs (TEC)	40,349	34,044

5. Method of Performance

Design and construction shall be performed by the Management and Operating contractor or subcontractor under the direction of the Management and Operating contractor.

* The DOE escalation rates (percent per year) are not segregated due to preconceptual nature of estimate.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Total
Project cost						
Facility cost						
Design	9,490	1,348	2,500	3,929	373	17,640
Construction	2,505	988	1,201	8,011	10,004	22,709
Total facility costs (Federal and Non-Federal)	11,995	2,336	3,701	11,940	10,377	40,349
Other project costs						
R&D necessary to complete project.[a]	8,830	4,909	4,700	1,600	0	20,039
Conceptual design cost.[b]	300	0	2,000	0	0	2,300
NEPA documentation costs.[c]	100	0	0	0	0	100
Other project-related costs.[d]	3,285	2,036	3,068	5,000	3,844	17,233
Total other project costs	12,515	6,945	9,768	6,600	3,844	39,672
Total project costs (TPC)	24,510	9,281	13,469	18,540	14,221	80,021

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.).[e]	2,400	2,400
Annual facility maintenance and repair costs	100	100
Programmatic effort related to facility	0	0
Other annual costs	100	100
Total related annual funding *(operating from FY 2002 through FY 2002)*	2,600	2,600

[a] Includes cost associated with the development of the vitrification process.

[b] The conceptual design was originally completed in November 1995. A new conceptual design is being prepared for an alternate melter system.

[c] Includes cost associated in complying with National Evironmental Policy Act of 1969.

[d] Includes all costs associated with the process development, training, procedures and facility support during construction of the project including Radcon protection.

[e] The operating life of this facility will be approximately 6 months. The staffing costs associated with this are expected to be $2,400,000 (12 FTEs).

Post 2006 Completion

Program Mission

The Post 2006 Completion account includes Environmental Management projects currently planned to require funding beyond FY 2006. Within the Defense Environmental Restoration and Waste Management appropriation, this account includes a significant number of projects at the largest Department of Energy sites--the Hanford site in Washington; the Savannah River site in South Carolina; the Idaho National Engineering and Environmental Laboratory in Idaho; the Oak Ridge Reservation in Tennessee--as well as, the Los Alamos National Laboratory in New Mexico; the Nevada Test Site; and the Waste Isolation Pilot Plant in Carlsbad, New Mexico. A variety of multi-site activities are also funded in this account, including the deposit to the Uranium Enrichment Decontamination and Decommissioning Fund.

After completion of cleanup, it will be necessary for the Environmental Management program to maintain a presence at most sites to monitor, maintain, and provide information on the contained residual contamination. These activities will be necessary to maintain the reduction in risk to human health. Such long-term stewardship will include passive or active controls and, often, treatment of ground water over a long period of time. The extent of long-term stewardship required at a site will reflect the end-state developed in consultation among the Department of Energy and other representatives of the Administration, Congress, Tribal Nations, representatives of regulatory agencies and state and local authorities, representatives of nongovernmental organizations, and interested members of the general public.

Program Goal

Accelerating cleanup and project completion is a central goal of the Environmental Management program. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths To Closure* document, whereby all Environmental Management sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules. For those sites in the Post 2006 Completion account, treatment will continue for the remaining "legacy" waste streams.

Program Objectives

- Continue to address the most serious environmental risks across the Department of Energy complex and ensure that facilities and activities pose no undue risks to the public and worker safety and health. This includes safe containment of high-level waste tanks at Hanford, Washington and Savannah River, South Carolina; and ensuring the safe storage of spent nuclear fuel at Hanford, Idaho, and Savannah River.
- Continue to be substantially in compliance with applicable environmental and other requirements and meet compliance milestones.
- Begin shipments of transuranic waste from various sites around the complex to the Waste Isolation Pilot Plant in FY 1999 and continue shipping and disposal operations in FY 2000.

Performance Measures

Environmental Management has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that Environmental Management has developed as a key component of the effort to accelerate cleanup and reduce costs. All Environmental Management activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, the Environmental Management sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	132,215	75,943	105,784	29,841	39.3%
Carlsbad Area Office	173,700	185,404	186,404	1,000	0.5%
Idaho Operations Office	304,380	317,046	291,253	-25,793	-8.1%
Nevada Operations Office	68,918	80,081	85,307	5,226	6.5%
Oak Ridge Operations Office	224,825	176,756	264,561	87,805	49.7%
Richland Operations Office	647,198	665,992	687,397	21,405	3.2%
Savannah River Operations Office	710,155	733,031	824,864	91,833	12.5%
Multi-Site	102,315	76,268	67,978	-8,290	-10.9%
D&D Fund Deposit					
Headquarters	388,000	398,088	420,000	21,912	5.5%
Total, Post 2006 Completion, Defense	2,751,706	2,708,609	2,933,548	224,939	8.3%

Albuquerque

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management, Post 2006 Completion program, carried out by the Albuquerque Operations Office is to support cleanup of some 2000 potential release sites at the Los Alamos National Laboratory in New Mexico and to provide for legacy waste management activities at the Los Alamos National Laboratory. In addition, the Los Alamos National Laboratory helps provide complex-wide solutions to issues associated with stabilization and storage of plutonium and other nuclear materials.

Program Goal

The Albuquerque Operations Office goal is to complete cleanup of all geographic sites under its cognizance in this account by FY 2006, except for the cleanup of the Los Alamos National Laboratory, which will be complete in FY 2015. Since the Los Alamos National Laboratory has a continuing Defense Programs mission, Environmental Management is planning for any required surveillance and maintenance and ground water monitoring activities to be budgeted for by the Department of Energy's Defense Programs, although this agreement has not been formally discussed with Defense Programs yet. The Los Alamos National Laboratory also manages programs which help reduce the potential for public exposure to nuclear materials through retrieval of excess plutonium-239 neutron sources and stabilization of at-risk excess nuclear materials. The Nuclear Materials Stewardship Project Office assists in the implementation of the Environmental Management Excess Materials Management Plan, which supports accelerated closure of Environmental Management sites and facilities.

Program Objectives

The program objective for the Los Alamos National Laboratory is to have all contaminated sites remediated and all legacy waste disposed of by FY 2015. The Los Alamos National Laboratory's goal is to complete the work-off of legacy mixed low-level waste (approximately 637 m^3) by the end of FY 2004 and transuranic waste by the end of FY 2015. Treatment and disposal of all newly-generated mixed low-level waste and low-level waste as it is generated at the Albuquerque sites is funded by Defense Programs starting in FY 1999. A key initiative at the Los Alamos National Laboratory in FY 1999 will be to retrieve approximately 4,600 m^3 of waste from earth-covered storage pads and place into inspectable storage configurations in accordance with a State of New Mexico compliance order. The FY 2000 budget also provides for continued transuranic waste retrieval and preparation activities at the Los Alamos National Laboratory in support of shipment and disposal at the Waste Isolation Pilot Plant In FY 2000, the environmental restoration program will close out 28 release sites, complete 14 assessments, and decommission two facilities. The development and design processes and

improvements made in the Nuclear Material Facility Stabilization Research and Development Program will manage excess nuclear materials to help accelerate closure of sites and facilities, and the Plutonium-Beryllium Neutron Source Recovery Program will attempt to accelerate recoveries and process the remaining backlog of plutonium-239 neutron sources. The Nuclear Material Stewardship Project Office will coordinate, consolidate, and integrate research and development and other activities to expedite the movement of nuclear materials regarding their packaging and shipping.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by site table, as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Historically, the Albuquerque Operations Office's primary mission has been to manage sites that were involved in the research, development, production, and maintenance of nuclear weapons. The Los Alamos National Laboratory has an ongoing research mission and will maintain most of its 43 square miles of property but is considering transfer of 4,646 acres to the County/Pueblos for industrial, residential, or cultural use. The Los Alamos National Laboratory Environmental Restoration project is scheduled to be completed in FY 2008.
- Received certification (Los Alamos National Laboratory) from the Carlsbad Area Office for transuranic characterization and transportation to the Waste Isolation Pilot Plant (FY 1998).
- Continued monitoring activities and oversight of the New Mexico Agreements-in-Principle (FY 1998/FY 1999).

Environmental Restoration

- Completed assessment activities for 71 potential release sites and closed out 24 potential release sites (FY 1998). Complete assessments for 34 potential release sites, and close out 18 potential release sites (FY 1999).
- Completed work on 200 No Further Action proposals submitted in prior years (FY 1998).
- Decontaminated and decommissioned four structures (FY 1998) Decontaminate and decommission one additional structure (FY 1999).
- Completed two deep wells (FY 1998), and will install four alluvial aquifer wells and drill two additional deep wells (FY 1999).
- Submitted to the regulators the Pajarito Canyon Work Plan, the Resource Conservation and Recovery Act Feasibility Investigation Report for the County Airport Landfill, and a Corrective Measures Study Plan for Technical Area 16, Outfall 260 (FY 1998). Complete and plan to submit in the summer of 1999 the Environmental Restoration Report to Congress in response to Public Law 105-119 (Land Transfer) (FY 1999).

Waste Management - Legacy Waste

- Completed the Site Treatment Plan Annual Update Report and completed compliance monitoring (FY 1998).
- Characterized and disposed of 135.5 m^3 of mixed low-level waste (FY 1998) and 79 m^3 more of legacy mixed low-level waste (FY 1999).
- Retrieved legacy transuranic waste from Pad 1 and placed it into compliant storage (FY 1998), and will retrieve legacy transuranic waste from Pad 4 under earth cover and place into compliant storage (FY 1999).
- Installed characterization gloveboxes in the RAMROD facility (FY 1998/FY 1999).
- Upgrade the Los Alamos radioactive liquid wastewater treatment facility (FY 1998/FY 1999).
- Prepared, certified, packaged, and made road-ready 17 shipments of the Los Alamos National Laboratory legacy transuranic waste for shipment to the Waste Isolation Pilot Plant (FY 1998). Continue to prepare and certify transuranic waste for shipment to the Waste Isolation Pilot Plant (FY 1999).
- Treated and disposed of legacy mixed low-level waste according to the Site Treatment Plan (FY 1998/FY 1999).
- Transfer the Los Alamos National Laboratory newly generated new waste program to the Defense Programs (FY 1999).

Nuclear Material Facility Stabilization

- Continued the Research and Development program core technology component. Specific activities:
  - Completed many of the core technology projects needed to characterize materials science of stored materials.
  - Completed salt distillation technology for use at the Rocky Flats Environmental Technology Site.
  - Transferred pyrolysis technology to Hanford.
  - Began additional research and development activities identified by the Research and Development Committee in support of the Defense Nuclear Facilities Safety Board Recommendation 94-1 implementation (FY 1998).
- Continued activities to stabilize at-risk excess nuclear materials and to accelerate site closures in support of the Defense Nuclear Facilities Safety Board Recommendation 94-1 (FY 1998).
- Continued to analyze samples in support of shelf-life studies. The data is used in support of the exercise to develop a new plutonium storage standard (FY 1998).
- Continued experiments on the thermal conditions inside shipping containers with materials in food pack/volrath cans (FY 1998).
- Completed stabilization demonstrations for ash and graphite fines (FY 1998).

- Transferred residue "washing" technology to the Rocky Flats Environmental Technology Site (FY 1998).
- Began additional research and development activities as identified by the Research and Development Committee in support of the Defense Nuclear Facilities Safety Board Recommendation 94-1 implementation (FY 1998).
- Deliver two polycube pyrolysis units to Hanford (FY 1999).
- Continue shelf-life studies and surveillance (FY 1999).

Nuclear Criticality Predictability Program

- Evaluated data generated by the Nuclear Criticality Predictability Program at the Los Alamos National Laboratory and processed data in support of the Defense Nuclear Facilities Safety Board Recommendation 97-2 (FY 1998).
- Continued maintenance of production analytical software; continued training in the use of software systems; remediated code and nuclear data to reduce analytical uncertainties; validated new methods and technology; and provided technical support to DOE to plan and conduct its Nuclear Criticality Program (FY 1998/FY 1999).

Nuclear Materials Stewardship Project

- Supported the EM Nuclear Materials Integration Project with expertise in materials forms, locations, and inventories (FY 1998). Contribute to Trade Studies of material disposition options under Nuclear Material Integration (FY 1999).
- Prepared a complex-wide transportation plan for nuclear materials undergoing stabilization (FY 1998). Coordinate material transportation issues complex-wide for nuclear material undergoing stabilization and disposition (FY 1999).
- Coordinated preparation of a new plutonium storage standard (FY 1998). Publish new plutonium storage standard to support stabilization and disposition activities (FY 1999).

Plutonium/Beryllium Sources

- Removed over 1,100 plutonium-239-bearing neutron sources from the private and public sector since 1979. Approximately 300 such sources remain to be recovered (FY 1999).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AL004 / New Mexico Agreement in Principle	1,650	980	950	-30	-3.1%
AL008 / Nuclear Material Facility Stabilization R&D	14,100	12,920	12,900	-20	-0.2%
AL009 / LANL Environmental Restoration	60,830	42,387	68,100	25,713	60.7%
AL012 / LANL Waste Mgmt - Newly Generated Waste	26,603	0	0	0	0.0%
AL013 / LANL Waste Management - Legacy Waste	27,333	17,126	21,000	3,874	22.6%
AL026 / Pu/Beryllium Sources	0	1,738	1,834	96	5.5%
AL027 / Nuclear Criticality	225	0	0	0	0.0%
AL028 / Nuclear Material Stewardship Project Office	1,474	792	1,000	208	26.3%
Total, Albuquerque	132,215	75,943	105,784	29,841	39.3%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Los Alamos National Laboratory	130,565	74,963	104,834	29,871	39.8%
Albuquerque Operations Office	1,650	980	950	-30	-3.1%
Total, Albuquerque	132,215	75,943	105,784	29,841	39.3%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	63.0	4.0	14.0
Cleanups	35.0	9.0	26.0
Facility Decommissioning			
Cleanups	5.0	1.0	2.0
Transuranic Waste			
Storage (m^3)	9,141.9	9,142.0	9,142.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	194.0	0.0	0.0
Mixed Low-Level Waste (MLLW)			
Storage (m^3)	380.7	381.0	302.0
Disposal - DOE On-site/Commercial (m^3)	135.5	79.0	53.0
Low-Level Waste (LLW)			
Disposal - DOE On-Site/Commercial (m^3)	1,314.0	0.0	0.0
Hazardous Waste			
Disposal - On-Site/Commercial (MT)	3,289.2	0.0	0.0

Site Description

Los Alamos National Laboratory

The Los Alamos National Laboratory encompasses over 43 square miles in northern New Mexico and conducts major programs in multiple areas, including applied research in nuclear and conventional weapons development, nuclear fission and fusion, nuclear safeguards and security, and environmental and energy research. The waste produced includes low-level, mixed, hazardous, transuranic, sanitary waste streams, and small amounts of other waste from research. The primary waste management activities include storage, treatment, and disposal of transuranic and mixed low-level waste. All newly generated waste activities are transferred to the Office of Defense Programs in FY 1999. The Laboratory is comprised of over 2,000 release sites and about 130 facilities. Through FY 1998, remediation of 1,395 release sites and decommissioning of 41 facilities was completed. Completion of additional release sites and facilities are planned as follows: 9 release sites and one facility in FY 1999, and 28 release sites and two facilities in FY 2000. Because of its expertise with nuclear materials, the Los Alamos National Laboratory has been designated the lead laboratory for research and development efforts to support the Department's response to Defense Nuclear Facilities Safety Board Recommendation 94-1. In this capacity, the Los Alamos National Laboratory provides solutions to complex-wide technical and operational issues associated with stabilization and storage of plutonium and other nuclear materials.

Albuquerque Operations Office

The Department of Energy-Albuquerque manages, coordinates, tracks, and assists in the implementation of programs at the Los Alamos National Laboratory. Legal drivers at Albuquerque include the Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation, and Liability Act; National Environmental Policy Act; State laws and codes; and DOE Orders.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Los Alamos National Laboratory is managed through a performance-based management and operating contract to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Approximately 30 percent of the projects included in this section of the budget will have an independent cost review of the scope. The funds requested for FY 2000 are appropriate to perform the activities based on a historical level of effort cost.

AL004 / New Mexico Agreement in Principle

The New Mexico Agreement-in-Principle provides funding through a grant for the support of New Mexico's oversight and monitoring of the Department of Energy compliance with applicable environmental laws and regulations for the Los Alamos National Laboratory; Sandia National Laboratory, New Mexico; Lovelace Biomedical and Environmental Research Institute; and the Waste Isolation Pilot Plant. The New Mexico Environmental Department employees supporting Agreement-in-Principle activities are located on-site at the Department of Energy facilities in Los Alamos and Albuquerque and at the New Mexico Environmental Department in Santa Fe.

- Funds provide for surface water, ground water, air and soil monitoring activities.
- Preliminary review of environmental documents to expedite regulatory review process, which impacts cleanup schedules at the National Laboratories.
- Technical support/advice to Los Alamos and Sandia Citizens Advisory Boards.
- Technical support/advice to four Los Alamos Accord Pueblos.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Support/review of the Paths to Closure Plan and additional environmental documents.			
■ Site-sponsored public outreach activities at all three facilities.			
■ Increase public willingness to accept additional mission/scope at both National Laboratories.			
AL004	1,650	980	950

Metrics
No quantifiable corporate performance measures are associated with this project.

AL008 / Nuclear Material Facility Stabilization Research and Development

The Los Alamos National Laboratory is performing research and development activities as part of the Department's efforts to stabilize at-risk excess nuclear materials and to accelerate site closures. This program is being carried out primarily for the Department's response to the Defense Nuclear Facilities Safety Board Recommendation 94-1, which is the responsibility of the Office of Nuclear Material and Facility Stabilization. This recommendation focuses on accelerating the Department's efforts to reduce health and safety risks to workers, the public, and the environment. The Office of Nuclear Material and Facility Stabilization continues to direct the stabilization technology development activities under this project in coordination with the Nuclear Materials Stewardship Project Office in Albuquerque.

- Supports process development implementation to expedite removal of plutonium inventory from Rocky Flats and to expedite consolidation of excess plutonium inventories to reduce mortgage costs.
- Develop processes and improvements to support integrated management programs for excess nuclear materials.
- Design research experiments to address long-term technology issues (e.g., corrosion, radiolysis, etc.) in order to reduce technology and safety and health risks.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue activities in support of the Defense Nuclear Facilities Safety Board Recommendation 94-1 Implementation Plan.			
■ Continue stabilization technology development, technology transfer, and implementation support activities.			
■ Install neutron scattering instrument for demonstrating neutron scattering.			
■ Continue shelf-life studies, surveillance, and core technology functions.			
AL008	14,100	12,920	12,900

Metrics
No quantifiable corporate performance measures are associated with this project.

AL009 / LANL Environmental Restoration

This project protects human health and the environment from hazards posed by inactive and surplus DOE facilities and contaminated lands. The primary drivers for this project are the Laboratory's permit for corrective actions under the Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act and concerned stakeholders. There are 2,122 potential release sites, including sites on private, county, Federal, and DOE properties.

- Complete assessment of 14 potential release sites.
- Submit 28 potential release sites for No Further Action.
- Implement the Hydrogeologic Work Plan.
- Continue remedial action at Technical Area (TA)-21, TA-15, TA-16, and TA-10 sites. The Los Alamos Land Transfer activities will be partially funded, with one site assessment and one site completion.

AL009	60,830	42,387	68,100

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action			
Assessments	63.0	4.0	14.0
Cleanups	35.0	9.0	28.0
Facility Decommissioning			
Cleanup	5.0	1.0	2.0

AL012 / LANL Waste Mgmt - Newly Generated Waste

The responsibility for managing newly generated waste was transferred to the Defense Programs in FY 1999.

- No activity.

AL012	26,603	0	0

Metrics			
Low-Level Waste			
Disposal - DOE On-site/Commercial (m^3)	1,314.0	0.0	0.0
Hazardous Waste			
Disposal - On-site/Commercial (MT)	3,289.2	0.0	0.0

AL013 / LANL Waste Management - Legacy Waste

This project provides for the treatment, storage, or disposal of all legacy transuranic waste, including mixed transuranic waste and mixed low-level waste generated at the Los Alamos National Laboratory. The waste was generated at 33 technical areas and is treated, stored, and disposed in compliance with applicable Federal and state requirements.

- Complete the Site Treatment Plan, update annual report, and perform compliance monitoring.
- Dispose of legacy mixed low-level waste
- Store, sort, segregate, and repackage transuranic waste to reduce amount of transuranic waste in inventory.
- The State of New Mexico certified 194 cubic meters in Lot 1 as non-mixed transuranic waste in FY 1998, which can be shipped when the Waste Isolation Pilot Plant begins operation. No additional legacy transuranic waste will be fully certified.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Retrieve legacy transuranic waste under earthen cover and place into storage awaiting characterization.			
AL013	27,333	17,126	21,000

Metrics			
Transuranic			
Storage (m^3)	9,141.9	9,142.0	9,142.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	194.0	0.0	0.0
Mixed Low-Level Waste			
Storage (m^3)	380.7	381.0	302.0
Treatment (m^3)			
Disposal - DOE On-site/Commercial (m^3)	135.5	79.0	53.0

AL026 / Pu/Beryllium Sources

The Los Alamos National Laboratory conducts programs for the management of nuclear materials, including the Plutonium-Beryllium Neutron Source Recovery Project. The Neutron Source Recovery Project reduces the potential for public exposure to nuclear materials through the retrieval of excess plutonium neutron sources.

- Accelerate recoveries and process the remaining backlog of Pu-239 neutron sources.
- Develop implementation plan to integrate Plutonium/Beryllium capabilities with the Non-Defense funded Radioactive Source Recovery Program to address the Department's responsibilities for neutron sources.

AL026	0	1,738	1,834

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

AL027 / Nuclear Criticality

This project funded a portion of the Department's Nuclear Criticality Predictability Program to address implementation of the Defense Nuclear Facilities Safety Board Recommendation 97-2. The program was centralized under the Multi-Site Budget beginning in FY 1999.

- Program activities described in the Multi-Site Budget.

AL027	225	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

AL028 / Nuclear Material Stewardship Project Office

This project is designed to leverage field expertise in Nuclear Materials management in order to consolidate and expedite the movement of plutonium and other nuclear materials, thus allowing for accelerated shutdown of Environmental Management facilities.

- Integrate and coordinate research and development activities supporting Nuclear Materials Stewardship.
- Integrate research and development support to the Defense Nuclear Facilities Safety Board Recommendations 94-1 and 97-1, with needs identified by the Nuclear Material Integration Project.
- Produce and maintain the stewardship Integrated Research and Development Plan, providing multi-year identification of research and development needs, integration and planning activities, priorities, resource requirements, and issues.
- Integrate and coordinate nuclear material packaging and shipping activities.
- Chair the cross-site, cross-program Nuclear Materials Packaging and Shipping Committee.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Produce and maintain the Stewardship Integrated Transportation and Packaging Plan, providing multi-year identification of transportation and packaging needs, integration and planning activities, priorities, resource requirements, and issues.			
■ Lead and support the proposed trade study of the potential benefits/tradeoffs of disposing of excess strontium and cesium sources, standards and technical materials.			
■ Define and establish the National Isotope and Sealed Source Management Office. The scope will be to integrate, coordinate, and facilitate the planning for management (storage, recycle, and disposition) of the Department's excess nuclear sources, standards, and technical materials.			
■ Support accelerated site closure at locations such as Rocky Flats through optimization of material management solutions.			
■ Continue coordination of nuclear material transportation and storage issues.			
AL028	1,474	792	1,000
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Albuquerque	132,215	75,943	105,784

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
AL004 / New Mexico Agreement in Principle	
■ No significant change	-30
AL008 / Nuclear Material Facility Stabilization Research and Development	
■ No significant change	-20
AL009 / LANL Environmental Restoration	
■ Increased characterization and remedial actions to accomplish land transfer per new requirements of P.L. 105-119, as well as increased work in other areas, such as drilling new wells for hydrogeologic characterization	25,713
AL013 / LANL Waste Management - Legacy Waste	
■ Increase in transuranic waste volumes retrieved from under earthen cover and placed in above ground storage awaiting characterization	3,874
AL026 / Pu/Beryllium Sources	
■ Increase is for accelerated recovery and processing of sources to complete the remaining backlog, to implement operational changes to further reduce potential radiation exposure to workers at the Los Alamos National Laboratory, and to accommodate differences in overhead structures between the current Environmental Management program management and the previous Defense Programs management.	96
AL028 / Nuclear Material Stewardship Project Office	
■ Change is due to increase in project responsibilities to support accelerated closure of EM sites and implementation of Nuclear Material Integration Project recommendations. It also supports establishment of the National Isotope and Sealed Source Management Office	208
Total Funding Change, Albuquerque	29,841

Carlsbad

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management, Post FY 2006 Completion program, carried out by the Carlsbad Area Office, is to protect human health and the environment by opening and operating the Waste Isolation Pilot Plant for safe disposal of transuranic waste and by establishing an effective system for management of transuranic waste from generation to disposal. The disposal facility is located in southeastern New Mexico near Carlsbad, 2,150 feet (655 meters) underground in bedded salt. Transuranic waste is a by-product of the nation's nuclear weapons research, development, production, and decommissioning activities. Originally, transuranic waste was buried as low-level waste in Department of Energy constructed landfills. Since 1970, however, transuranic waste has been placed in retrievable storage pending the completion and opening of a geologic disposal facility. The Congress authorized the Waste Isolation Pilot Plant in 1979 (Public Law 96-164) as a research project to prove the feasibility of deep geological disposal for transuranic waste to protect human health and the environment. In October 1992, Congress passed the Waste Isolation Pilot Plant Land Withdrawal Act (Public Law 102-579), which permanently transferred public lands to the Department of Energy and defined the total capacity of the Waste Isolation Pilot Plant to be 6,200,000 cubic feet (175,600 m^3) of transuranic waste. Since October 1992, the Department has focused on activities directly related to the completion of the legislative prerequisites and to the demonstration of compliance with long-term disposal regulations and Resource Conservation and Recovery Act regulations in order to reach a disposal decision. In September 1996, Congress amended the Waste Isolation Pilot Plant Land Withdrawal Act to delete duplication in regulatory compliance and to streamline provisions of the Act. The Act, as amended, also authorizes the Department to annually provide $20,000,000 plus an annual Consumer Price Index increase, for 14 years starting in FY 1998, to the State of New Mexico for economic impact assistance.

Program Goal

The primary goal of the program is to meet all regulatory and technical requirements to begin disposal operations in the Waste Isolation Pilot Plant at the earliest opportunity. The Waste Isolation Pilot Plant startup is a key element in the Environmental Management strategy for disposal of transuranic waste under the Department of Energy control. Many of the Federal Facility Compliance Act consent orders and agreements between the States, agencies, and the transuranic waste sites are based on the assumption that the facility will receive transuranic waste in the immediate future. The Department remains committed to meeting all the near-term transuranic waste compliance agreements included in the various States Agreements. The transportation and disposal system capacity is scheduled to be available to meet the requirements of the compliance agreements; however, characterization and waste loading process adjustments will be required by the transuranic waste sites to meet recent requirements imposed by the State of New Mexico. Site processes are starting to reflect these procedural changes. In particular, the Idaho National Engineering and Environmental Laboratory is working to ensure that the 3,100 m^3 of transuranic waste will be disposed at the Waste Isolation Pilot Plant by December 31, 2002. By FY 2006, the Waste Isolation Pilot Plant expects to have disposed of approximately 40,000 m^3 of contact-handled transuranic waste and approximately 1,700 m^3 of remote-handled transuranic waste. Current planning has all transuranic waste at the Nevada Test Site, the Mound Plant, and selected small quantity sites disposed by FY 2006. The total volumes disposed by FY 2006 represent 40 percent of the current inventory of 109,000 m^3 of transuranic waste now stored at the sites, and 24 percent of the total capacity of 175,600 m^3. During the planned 35-year disposal phase, waste will be received from 10 major sites and 13 small quantity sites. The disposal phase is followed by a five-year decommissioning and dismantlement phase.

The planned end state for the Waste Isolation Pilot Plant is to have all qualified Department of Energy transuranic waste disposed and to decommission and dismantle all surface facilities at the Waste Isolation Pilot Plant site. Life-cycle costs in FY 1998 dollars for the period FY 1997-2006 are $1,825,300,000 and post FY 2006 costs are expected to be $5,897,548,000. The key risk reduction factor that is addressed by the Waste Isolation Pilot Plant is the elimination of potential hazards to the public, workers, and environment by permanently disposing transuranic waste in a deep underground repository. The Privatization Appropriation for FY 1998 included $21,000,000 for capital equipment for shipping containers such as the Transuranic Waste Package Transporter II necessary to fully implement the contact-handled transuranic waste transportation system. The Privatization Appropriation for FY 1999 included $19,605,000 to develop and fabricate the 72B cask, which will be used to transport remote-handled transuranic waste by the selected privatized contractor. These two privatization projects are expected to save more than $290,000,000 in the Waste Isolation Pilot Plant funding requirements over the next 35 years.

Program Objectives

The Environmental Management Program expects the Waste Isolation Pilot Plant to meet transuranic waste disposal goals by ramping up to a receipt rate of 14 contact-handled transuranic waste shipments per week by the end of FY 2000 and 17 shipments per week by December 31, 2000. The expected transuranic waste shipment capacity will increase from about 165 in FY 1999 to about 422 in FY 2000. The expected transuranic waste disposal capability will increase from about 1,320 m^3 in FY 1999 to about 3,376 m^3 in FY 2000. The facility is also relying on privatization of contact-handled and remote-handled transuranic waste transportation services to reduce costs. There are no additional major projects planned for the Waste Isolation Pilot Plant Site. Future construction needs will be covered under the general plant project funding.

The Carlsbad Area Office vision is to serve as the model for public management of transuranic waste and to be perceived by stakeholders as setting new standards of excellence. The Carlsbad Area Office funds a wide variety of institutional programs that provide economic impact assistance and operational oversight. Institutional support provides additional funding for other activities such as the Environmental Evaluation Group, Carlsbad Environmental Monitoring and Research Center, Western Governors' Association, Southern States Energy Board, cooperative agreements with Indian Tribes, New Mexico Emergency Response, New Mexico Impact Assistance, and other activities. Funding for these activities totals $31,700,000 in FY 2000. Prior year funding was $35,200,000 in FY 1999, and $31,100,000 in FY 1998.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by site table; as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Issued the Waste Isolation Pilot Plant Supplemental Environmental Impact Statement Record of Decision for disposal operations on January 16, 1998 (FY 1998).
- Declared the Waste Isolation Pilot Plant Operational Readiness on March 26, 1998 (FY 1998).
- Received Environmental Protection Agency Certification of the Waste Isolation Pilot Plant compliance with disposal regulations on May 13, 1998 (FY 1998).
- Notified Congress on May 13, 1998, of intent to operate the Waste Isolation Pilot Plant as a disposal facility (FY 1998).
- Received the draft Waste Isolation Pilot Plant Resource Conservation and Recovery Act Part B permit from the New Mexico Environment Department on May 15, 1998 (FY 1998).
- Received notification from the Defense Nuclear Facilities Safety Board that the Waste Isolation Pilot Plant can be operated safely on June 3, 1998 (FY 1998).
- Provided $20,000,000 to the State of New Mexico for impact assistance (FY 1998).

- Received the State of New Mexico letter of determination that the Los Alamos National Laboratory waste proposed for initial shipment to the Waste Isolation Pilot Plant is not subject to the Resource Conservation and Recovery Act in December 1998 (FY 1999).
- Obtain the Environmental Protection Agency approval of the Rocky Flats Environmental Technology Site and the Idaho National Engineering and Environmental Laboratory Quality Assurance and Waste Characterization Programs (FY 1999).
- Award Contact-Handled Transuranic Waste Transportation Services privatization contract (FY 1999).
- Receive favorable litigation decisions and initiate transuranic waste shipments to the Waste Isolation Pilot Plant (FY 1999).
- Begin to receive waste from the transuranic waste generator sites at an initial rate of one shipment per week increasing to five shipments per week by the end of FY 1999 (FY 1999).
- Receive the Waste Isolation Pilot Plant Resource Conservation and Recovery Act Part B final permit from the State of New Mexico (FY 1999)
- Award Remote-Handled Transuranic Waste Transportation Services privatization contract (FY 1999 or early FY 2000).
- Provide $20,300,000 to the State of New Mexico for impact assistance (FY 1999).

Program Shifts

- The June 1998 "Accelerating Cleanup: Paths to Closure" included schedules and performance metrics based upon opening the Waste Isolation Pilot Plant in late May or June of FY 1998. These assumptions were based on the need to meet current transuranic waste sites' compliance agreements wherever possible.
- The Department of Energy anticipates that the State of New Mexico will issue to the Waste Isolation Pilot Plant a final Resource Conservation and Recovery Act Part B Permit for disposal of hazardous (mixed) transuranic waste during FY 1999 At the current time, the Department of Energy is only eligible to dispose of non-mixed transuranic waste at the Waste Isolation Pilot Plant until a Resource Conservation and Recovery Act permit is granted
- On May 13, 1998, the Environmental Protection Agency issued a final rulemaking that certified that the Waste Isolation Pilot Plant complies with the Agency's radioactive waste disposal regulations Following Environmental Protection Agency's certification of the Waste Isolation Pilot Plant, the Department of Energy informed Congress of the Department's intent to begin disposal operations at the facility since all the Waste Isolation Pilot Plant Land Withdrawal Act disposal prerequisites had been completed. The start of disposal operations at the Waste Isolation Pilot Plant has been delayed pending the resolution of a 1992 Permanent Injunction for shipping waste to the Waste Isolation Pilot Plant for the now canceled test phase. Also, on July 17, 1998, three lawsuits were filed against the Environmental Protection Agency over its decision to certify the Waste Isolation Pilot Plant for radioactive waste disposal operations.

- Within these constraints, the Department remains committed to doing all it can to meet its obligations to the various States for the cleanup of its sites. Disposal operations are expected to begin in FY 1999, provided that all legal constraints have been resolved.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
CAO-1 / WIPP Base Operations	101,979	106,621	111,698	5,077	4.8%
CAO-2 / WIPP Disposal Phase Certification and Experimental Program	39,862	37,387	35,295	-2,092	-5.6%
CAO-3 / WIPP Transportation	9,186	17,494	19,222	1,728	9.9%
CAO-4 / WIPP TRU Waste Sites Integration and Preparation	22,673	23,902	20,189	-3,713	-15.5%
Total, Carlsbad	173,700	185,404	186,404	1,000	0.5%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Waste Isolation Pilot Plant	173,700	185,404	186,404	1,000	0.5%
Total, Carlsbad	173,700	185,404	186,404	1,000	0.5%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Transuranic Waste			
Inventory - Interim Storage (m^3)			
Disposal Capability - DOE On-Site (m^3)	0.0	1,320.0	3,376.0

Site Description

Waste Isolation Pilot Plant

The Waste Isolation Pilot Plant facility is comprised of surface support buildings, a waste-handling building, four shafts, and the mined underground operations area. The facility is designed for deep geological disposal of defense-generated transuranic waste resulting from nuclear weapons production, dismantlement, and site cleanup. The repository is located in southeastern New Mexico near Carlsbad, 2,150 feet (655 meters) underground in bedded salt. The bedded salt where transuranic waste will be disposed has been stable for over 225 million years, and, through extensive computer modeling and experiments, the Department of Energy has successfully demonstrated to the Environmental Protection Agency that the salt will remain stable for at least the next 10,000 years. On May 13, 1998, the Environmental Protection Agency certified that the Waste Isolation Pilot Plant complies with the radioactive waste disposal standards, and the Department of Energy notified Congress that the Waste Isolation Pilot Plant was ready to begin disposal operations. However, only non-mixed transuranic waste will be disposed until the State of New Mexico has issued a Resource Conservation and Recovery Act Part B Permit.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The managing and operating contractor, Westinghouse Waste Isolation Division, accounts for approximately 50 percent of the Carlsbad Area Office funding requirements. Westinghouse operates the Waste Isolation Pilot Plant through a contract that is nearly 90 percent Fixed Price. The remaining funding contracting vehicles are dependent upon existing contracting mechanisms, such as national laboratories, grants, and agreements in principle. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. All of the projects included in this section of the budget have had an independent review through the Carlsbad Area Office's program planning process. There are no projects covered by the Office of Management and Budget A-11, Part B, in this section of the budget.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CAO-1 / WIPP Base Operations			
This project provides for all activities required to maintain waste receipt and disposal operations including: mining, waste handling, surface and underground facility operations, compliance with State and Federal laws related to safety and health and operational permits, and administrative infrastructure. Also included is the legislative commitment to pay Impact Assistance to the State of New Mexico ($20,900,000) in FY 2000.			
■ Continue receiving waste from the transuranic waste generator sites.			
■ Transuranic waste shipment capability will increase from about 165 in FY 1999 (1,320 m^3) to about 422 in FY 2000 (3,376 m^3.)			
CAO-1	101,979	106,621	111,698
Metrics			
Transuranic Waste			
TRU Inventory - Interim Storage (m^3)			
Disposal Capability - DOE On-Site (m^3)	0.0	1,320.0	3,376.0

CAO-2 / WIPP Disposal Phase Certification and Experimental Program

This project includes experimental and performance assessment work in support of the recertification and operational performance improvements for the Waste Isolation Pilot Plant site and the national transuranic waste system; and establishing a focused international nuclear waste disposal research and development program.

- Continue to develop and maintain an up-to-date performance assessment capability to support the Waste Isolation Pilot Plant recertification in FY 2003.
- Conduct monitoring, confirmatory testing, and experimental activities to support the Waste Isolation Pilot Plant recertification in FY 2003.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue Actinide Source Term tests at the Los Alamos National Laboratory and Gas Generation tests at Argonne National Laboratory-West/Idaho National Engineering and Environmental Laboratory in support of the Environmental Protection Agency Recertification.			
CAO-2	39,862	37,387	35,295

Metrics
No quantifiable corporate performance measures are associated with this project.

CAO-3 / WIPP Transportation

This project includes all activities related to transportation, such as Emergency Response training, establishing and opening transportation corridors; all contact-handled and remote-handled packaging initiatives; carrier services for transporting waste to the Waste Isolation Pilot Plant; and stakeholder interfaces with the Western Governors Association, the Southern States Energy Board and Native American Tribes.

■ Provide transportation services for the shipment to the Waste Isolation Pilot Plant for contact-handled transuranic waste from the waste generator sites.			
CAO-3	9,186	17,494	19,222

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
CAO-4 / WIPP Transuranic Waste Sites Integration and Preparation			
This project includes program integration and infrastructure activities required to prepare the Department of Energy transuranic waste complex for waste shipments to the Waste Isolation Pilot Plant including all certification-like activities performed by the Carlsbad Area Office. This project also includes the Secretary of Energy commitments to outside stakeholders such as: the Carlsbad Environmental Monitoring and Research Center, the Technical Training Center, as well as oversight commitments to the National Academy of Sciences and the Environmental Evaluation Group. Also included are infrastructure support costs such as the Interagency Agreement with the Bureau of Land Management.			
■ Continue quality assurance and waste certification audit activities to certify transuranic waste shipments to the Waste Isolation Pilot Plant.			
■ Continue remote-handled integration activities to ensure receipt of remote-handled waste in FY 2002.			
CAO-4	22,673	23,902	20,189
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Carlsbad Area Office	173,700	185,404	186,404

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
CAO-1 / WIPP Base Operations	
■ Increase contact-handled transuranic waste receiving capabilities at the Waste Isolation Pilot Plant from 1,320 m^3 in FY 1999 to 3,376 m^3 in FY 2000; and full panel mining operations, and inflationary increase of $600,000 over the FY 1999 payment to the State for Economic Impact Assistance.	5,077
CAO-2 / WIPP Disposal Phase Certification and Experimental Program	
■ Decrease occurs as the program decides not to accelerate the completion of simulation model upgrades in support of first recertification, and also reflects reduced experimental program activities.	-2,092
CAO-3 / WIPP Transportation	
■ Increase transportation rates from five shipments per week to 14 shipments per week by the end of FY 2000 and 17 shipments per week by December 31, 2000.	1,728
CAO-4 / WIPP Transuranic Waste Sites Integration and Preparation	
■ Decrease reflects completion of most of the reports mandated by the Waste Isolation Pilot Plant Land Withdrawal Act and efficiencies attained from a full year of operational status.	-3,713
Total Funding Change, Carlsbad	1,000

Idaho

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Post 2006 Completion, Environmental Management account, carried out by the Idaho National Engineering and Environmental Laboratory is to safely manage and dispose of high-level radioactive waste, transuranic waste, and spent nuclear fuel, while maintaining full compliance with applicable requirements and agreements, particularly the Idaho Settlement Agreement, and completion of the environmental restoration activities under the Federal Facility Agreement and Consent Order.

Program Goal

The Environmental Management work is projected to continue at the Idaho National Engineering and Environmental Laboratory through 2060. The primary goal of the Post 2006 completion account is to meet the Idaho Settlement Agreement, which includes treatment, storage, and disposal operations for transuranic waste, high-level waste, and mixed waste, dry storage and transfer of spent nuclear fuel, closure of remaining Comprehensive Environmental Response, Compensation, and Liability Act remediation sites and surveillance and maintenance of contaminated facilities until deactivation, decontamination and decommissioning, or facility disposal can be accomplished. Necessary infrastructure upgrades will be performed to support these ongoing activities. The Idaho Settlement Agreement requires spent nuclear fuel to be packaged for transfer and removed from Idaho by January 1, 2035. Idaho is the "lead laboratory" for integrating DOE-owned spent nuclear fuel activities and is the interface with the DOE Office of Civilian Radioactive Waste Management. A key goal of this program is to assure that all DOE owned fuel will be acceptable for disposal in a geologic repository. The budget request assumes both productivity improvements and projected efficiencies

Program Objectives

The objective of this program is to complete all remediation efforts for the site under the Federal Facility Agreement and Consent Order. The program also will provide for interim dry storage of spent nuclear fuel produced for the Idaho National Engineering and Environmental Laboratory reactors, foreign and domestic research reactors, and other DOE site reactors, and in addition, manage spent nuclear fuel at Ft. St. Vrain in Colorado. The objective is also to provide for safe storage, pretreatment, and disposal of high-level waste, low-level waste, mixed low-level waste, and mixed transuranic waste generated by waste treatment and decontamination activities at the Idaho Nuclear Technology and Engineering Center All of the legacy high-level waste has been pretreated and converted to a calcine, with only sodium-bearing liquid waste remaining in the tank farm from decontamination and waste treatment activities. The high-level waste project objective is to continue calcining liquid waste through the first half of FY 1999, and then place the calciner in standby, pending a decision on upgrading it to meet

regulatory requirements or the selection of an alternative technology. The high-level waste project objective provides for continued management through safe storage, liquid evaporation, and continued decontamination activities (debris treatment and filter leaching).

In addition the following objectives are governed by the Settlement Agreement (October 17, 1995) with the State of Idaho:

- The high-level waste activities will treat sodium-bearing waste by 2012.
- The Department of Energy will empty the 11 High-Level Waste Tanks by 2012. Under a Consent Order modification signed in FY 1998, the Department of Energy will empty the five pillar and panel tanks by FY 2003 and accelerate their closure several years earlier than 2012.
- Submit a closure plan for at least one tank by December 2000.
- By December 2035, all high-level waste at the Idaho National Engineering and Environmental Laboratory will be treated and road ready for shipment out of Idaho.
- The Department of Energy will begin negotiations with the State in December 1999 on final plan and schedule for treatment of high-level waste, following the development of the Idaho National Engineering and Environmental Laboratory High-Level Waste and Facility Disposition Environmental Impact Statement.
- Decision on future calciner operations by June 2000.
- The Department of Energy will begin operating a new privatized dry spent nuclear fuel storage facility by July 1, 2003, and complete the transfer of all spent fuel from wet storage facilities to dry interim storage by December 31, 2023.
- The Department of Energy will remove all spent fuel from Idaho by January 1, 2035.
- The Advanced Mixed Waste Treatment Project will meet the Idaho Settlement Agreement through awarding the Advanced Mixed Waste Treatment Project contract (actual award December 1996); completing construction of the Advanced Mixed Waste Treatment Project by December 31, 2002; commencing operations by March 31, 2003; begin shipping a running average of at least 2,000 m^3 of transuranic waste out of the State of Idaho each year after January 1, 2003; and completing the shipment of 65,000 m^3 of transuranic waste to the Waste Isolation Pilot Plant, or another such facility designated by DOE, by a target date of December 31, 2015, but no later than December 31, 2018.

By FY 2006 the Idaho National Engineering and Environmental Laboratory plans to accomplish the following objectives:

- Over 40 percent of the Department of Energy's spent nuclear fuel in fuel handling units as counted in FY 1998 will be transferred to dry interim storage.
- Approximately 19,500 m^3 of stored transuranic and alpha low-level mixed waste will be treated by the Advanced Mixed Waste Treatment Project and shipped to the Waste Isolation Pilot Plant or another appropriate facility for disposal.
- Newly generated mixed waste will be treated in the Advanced Mixed Waste Treatment Project facility, at other Department of Energy facilities, or at commercial treatment facilities.

- All Records of Decision for environmental restoration work at the Idaho National Engineering and Environmental Laboratory should be negotiated by FY 2003.
- 100 percent of environmental restoration assessments, and 90 percent of release sites will be completed.
- Two High-Level Liquid Waste Tanks will be closed.

A major objective of the Environmental Management Program at the Idaho National Engineering and Environmental Laboratory is to use technology development to ensure completion of the primary goals. These technologies will accelerate cleanup schedules and reduce costs. Innovative technologies continue to be developed to meet the Idaho National Engineering and Environmental Laboratory needs and will be demonstrated and implemented as necessary to meet schedules and budgets. Examples of these technologies include:

- Process studies to increase the sodium bearing radioactive waste throughput at the calciner facility.
- Demonstrations of solvent extraction processes to remove transuranic waste and strontium components from sodium bearing wastes.
- Development of pilot scale vitrification methods, including development work on cross flow filtration system to remove particulates from the waste stream.
- Demonstration of advanced transuranic waste characterization systems needed to improve throughput and increase efficiency.
- Use of the light duty utility arm to characterize tank heels.
- Deployment of the Rapid Geophysical Surveyor for ultra-high resolution geophysical mapping and adaptation of the dig face characterization instrumentation with the Global Positioning Radiometric Scanner System for broad area radiation mapping.
- Remote Excavator for removal of unexploded ordnance.
- Demonstration of in situ bioremediation of organic contaminants at an injection well.
- Stabilization of the Waste Experimental Reduction Facility fly ash and other low activity waste.
- Passive Vapor Vacuum Extraction for removal of below surface organic vapors.
- Robotics and advanced systems for waste handling and deactivation and decommissioning.
- Decommissioning of highly contaminated fuel pools and associated structures using innovative technologies.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Initiated remedial activities associated with the comprehensive Record of Decision for the Test Reactor Area (FY 1998), and complete remedial actions and initiate operations and maintenance activities at Operable Unit 2-13 (FY 1999) Waste Area Group 2.
- Completed two Facility Assessments and four Facility/Structure Decontamination and Decommissionings completions (FY 1998); complete five Facility Assessment and eight Facility/Structure Decontamination and Decommissioning completions (FY 1999).
- Continued the Vacuum Vapor Extraction Remedial Action and ground water and Pad A monitoring (FY 1998, Waste Area Group 7).
- Developed plan for Stage 1 subsurface exploration of Pit 9 to obtain materials for bench-scale treatability studies for Transuranic Pits and Trenches Projects (FY 1998 Waste Area Group 7); conduct bench-scale treatability studies on waste materials from Pit 9 and characterization concerning waste form and contaminate migration for Transuranic Pits and Trenches (Operable unit - 7-13/14) (FY 1999).
- Developed Work Plan Addendum for Operable Units 7 13/14 (FY 1998 Waste Area Group 7).
- Continued Meteorologic Monitoring, Seismic Monitoring, Emergency Preparedness, Environmental Monitoring, Experimental Breeder Reactor-1, Architect/Engineer and Cost Estimating Standards, and Integrated Facility Planning Activities (FY 1998/FY 1999).
- Completed a limited portion of backlog of maintenance and repair safety and health correction items (FY 1998/FY 1999).
- Completed safety and health corrective action plan for July 1998, Idaho National Engineering and Environmental Laboratory Worker Fatility (FY 1999).
- Completed calcining of high-level waste in FY 1998, several months earlier than the Settlement Agreement milestone.
- Initiated calcining of the sodium bearing waste in FY 1998, several years earlier than the Settlement Agreement Milestone, and continued to process liquid waste during FY 1998 and first half of FY 1999.
- Received foreign research reactor fuel shipments safely and without incident (FY 1998).
- Carry out Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant) infrastructure operations (e.g., provide steam for 130 buildings, 147,000 kilowatt hours per bay of power, and 2,500,000 gallons of water) (FY 1998/FY 1999).

- Transferred 225 units of spent nuclear fuel out of wet storage at the Chemical Processing Plant-603 into more modern storage at the Chemical Processing Plant-666 (FY 1998).
- Completed peer review of plutonium research and development priorities to accomplish plutonium stabilization (FY 1998).
- Complete the Draft Comprehensive Record of Decision for Idaho Nuclear Engineering Technology Center (Waste Area Group 3) in March 1999; for Test Area North (Waste Area Group 1) in April 1999; for Central Facilities Area (Waste Area Group 4) in July 1999; and for the Power Burst Facility (Waste Area Group 5) in August 1999.
- Complete final Record of Decision for Waste Area Group 3, (July FY 1999).
- Develop plans for Stage 2 limited retrieval/excavation in selected areas of Pit 9 and pilot-scale treatability studies and tests (FY 1999).
- Complete construction on all approved FY 1998 and prior general plant project facility upgrades (FY 1999).
- Complete conceptual design for the proposed FY 2001 Sitewide Idaho National Engineering and Environmental Laboratory Information Network (FY 1999).
- Issue a Record of Decision for shipment and ultimate disposal of spent nuclear fuel outside of Idaho (FY 1999).
- Begin transferring fuel from wet storage in the Test Area North-607, Nuclear Hot Shop, pool to the interim dry storage facility (FY 1999).
- Continue transfer of spent nuclear fuel from wet storage at the Chemical Processing Plant-603 to wet storage at the Chemical Processing Plant-666 and dry storage at the Interim Fuel Storage Facility (FY 1999).
- Complete prototype system for non-destructive assay of spent nuclear fuel by September 1, 1999, (FY 1999).
- Transfer the Plutonium Focus Area to the Office of Science and Technology (FY 1999).
- Complete Phase I of the Advanced Mixed Waste Treatment Project, including the National Environmental Policy Act evaluation; the Department of Energy Environment, Safety, and Health Authorization; environmental regulatory permitting, and associated design in support of an Idaho Settlement Agreement milestone to complete construction of a mixed waste treatment facility by December 31, 2002, (FY 1999).
- Prepared Federal Facilities Compliance Act Annual Mixed Waste Report to Congress (FY 1998).
- Completed comparisons of Waste Acceptance Criteria for six waste management disposal sites for potential integration opportunities (FY 1998).
- Prepare Integrated Burn Plan for the Department Incinerator System Team (FY 1999).
- Complex-Wide Waste Acceptance Audit Team will begin audits of generators sending waste to the DOE disposal sites (FY 1999).

- Commercial Treatment and Disposal Site Audit Team will audit commercial sites used by the DOE with the results being accepted by all DOE generating sites rather than each DOE site sending its own team (FY 1999).
- Implementation and oversight of the standardized mixed low-level waste characterization program (FY 1999).
- Carry out activities in order to meet the Idaho Settlement Agreement, Federal Facility Compliance Agreement, Federal Facility Agreement/Consent Order, and other regulatory requirements in a safe and environmentally acceptable manner (FY 2000).
- Obtain a Record of Decision for High-Level Waste and Facilities Disposition Environmental Impact Statement, submit Tank Closure Plan for one tank, and negotiate with State for plan and schedule for treatment of calcined high-level waste (FY 2000).
- Commence negotiations with the State of Idaho to develop a mutually agreeable schedule to place Spent Nuclear Fuel into dry interim storage in support of Settlement Agreement, and continue moving TMI-2 fuel from wet to dry interim storage per Settlement Agreement milestone to complete by June 1, 2001 (FY 2000).
- Continue to reduce risk of Spent Nuclear Fuel placed in vulnerable storage by conducting activities such as the transfer of Spent Nuclear Fuel form first generation to second generation dry storage wells at CPP-749 and complete transfer of Spent Nuclear Fuel in CPP-603 aged wet storage to improved storage locations (FY 2000)
- Comply with Federal Facilities Agreement/Consent Order schedules and milestones for the assessment and cleanup of Test Area North, Test Reactor Area, Idaho Nuclear Technology Engineering Center, Central Facilities Area, Power Burst Facility, Radioactive Waste Management Complex, Pit 9 Remediation, and for site-wide monitoring (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-1D / Security Investigations	0	508	508	0	0.0%
ID-CTREXC-101 / Low-Level Waste/Mixed Low-Level Waste Center of Excellence	498	395	0	-395	-100.0%
ID-ER-102 / Test Reactor Area Remediation	1,647	2,893	1,660	-1,233	-42.6%
ID-ER-103 / Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant) Remediation	2,995	11,404	13,815	2,411	21.1%
ID-ER-106 / Radioactive Waste Management Complex Remediation	39,053	23,700	7,013	-16,687	-70.4%
ID-ER-107 / Pit 9 Remediation	0	2,941	2,379	-562	-19.1%
ID-ER-108 / Site-wide Monitoring Area Remediation	3,386	3,529	6,144	2,615	74.1%
ID-ER-109 / Remediation Operations	14,955	19,872	14,984	-4,888	-24.6%
ID-ER-110 / Decontamination and Decommissioning	7,374	5,339	7,866	2,527	47.3%
ID-HLW-101 / High-Level Waste Pretreatment	40,038	38,546	38,751	205	0.5%
ID-HLW-103 / High-Level Waste Treatment and Storage	18,312	13,053	24,674	11,621	89.0%
ID-HLW-105 / Low Activity Waste Treatment	0	2,108	5,712	3,604	171.0%
ID-LRP-101 / Environmental Engineering and Science Center	8,000	61	0	-61	-100.0%
ID-OIM-101 / Site-wide Landlord Operations	23,076	29,604	34,626	5,022	17.0%
ID-OIM-102 / Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant) Non-Process Plant Operations	51,240	60,165	51,283	-8,882	-14.8%
ID-OIM-116 / Environmental Legacy Compliance (VCO)	0	0	9,077	9,077	>999.9%
ID-SNF-101 / National Spent Nuclear Fuel Program	21,952	26,092	14,275	-11,817	-45.3%
ID-SNF-102 / Integrated Spent Nuclear Fuel Program	20,683	9,159	7,689	-1,470	-16.1%
ID-SNF-103 / Emptied Spent Nuclear Fuel Facilities	29,524	37,920	30,601	-7,319	-19.3%
ID-WM-105 / AMWTP Production Operations	3,212	8,610	527	-8,083	-93.9%
ID-WM-106 / Idaho National Engineering and Environmental Laboratory Site-wide Environmental Protection	5,176	6,988	7,508	520	7.4%
ID-WM-108 / Integrated Waste Operations Program	13,259	14,159	12,161	-1,998	-14.1%
Total, Idaho	304,380	317,046	291,253	-25,793	-8.1%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Idaho National Engineering and Environmental Laboratory	304,380	317,046	291,253*	-25,793	-8.1%
Total, Idaho	304,380	317,046	291,253	-25,793	-8.1%

*The total program activity funding in FY 2000 totals $334,253,000. Due to the termination of the Pit 9 subcontract, $43,000,000 will be made available in uncosted carryover to provide for the phased alternate approach.

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Sites			
Assessments	15.0	38.0	0.0
Cleanups	7.0	11.0	6.0
Facility Decommissioning			
Assessments	2.0	5.0	15.0
Cleanups	4.0	8.0	11.0
High-Level Waste			
Treatment (m^3)	760.0	732.0	1,041.0
Storage (m^3)	9,367.0	9,062.0	8,085.0
Disposal	0.0	0.0	0.0
Spent Nuclear Fuel			
Stabilized (MTHM)	.51	6.0	53.1

Site Description

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory, established as the National Reactor Testing Station in 1949, occupies 890 square miles in the Snake River Plain of Southeastern Idaho.

Over the years, 52 reactors have been constructed and operated at the Idaho National Engineering and Environmental Laboratory. The Idaho National Engineering and Environmental Laboratory has nine primary facilities as well as administrative, engineering, and research laboratories in Idaho Falls, approximately 50 miles east of the site. Other activities at the Laboratory over the last five decades include nuclear technology research, defense programs, engineering testing and operations, as well as ongoing projects to develop, demonstrate, and transfer advanced engineering technology and systems to private industry. These activities have resulted in an inventory of high-level waste and an inventory and continued generation of transuranic waste, mixed low-level, and low-level waste. Waste storage, treatment, and disposal capabilities for these ongoing programs are provided through operations at the Waste Reduction Operations Complex, the Radioactive Waste Management Complex, Test Area North, and the Idaho Nuclear Technology Engineering Center (formerly the Idaho Chemical Processing Plant) The Idaho National Engineering and Environmental Laboratory is responsible for storing and dispositioning 570 m^3 of spent nuclear fuel from a number of sources, including the Navy, foreign and domestic research reactors, and some commercial reactors with the Department of Energy owned fuel. Environmental remediation activities are required at ten Waste Area Groups encompassing 50 different operable units, which are comprised of 508 total release sites and facilities. Five Waste Area Groups are part of this appropriation. Potential release sites include tanks, spills, disposal sites, wastewater disposal systems, leach pits, trenches, rubble piles, ponds, cooling towers, wells, landfills, storage areas, and surplus buildings.

Infrastructure projects (ground, roads, general purpose buildings, utilities, communications, computers and information, fleet management, emergency services, analytical laboratories, and environmental test facilities) ensure the integrity of required facilities until all commitments are completed. Site-wide core support functions include Integrated Facility Planning, Emergency Preparedness, Seismic and Environmental Monitoring, and Safety and Health Corrective Actions. Other ongoing activities include regulatory affairs, nuclear safety, radiation protection, utility operations and maintenance, quality assurance, work control, document control, warehousing, and facility management In addition, general plant projects and installation of General Purpose Capital Equipment, Line-Item Construction Projects ensure the site facilities can support basic mission needs

Infrastructure Operations at the Idaho Nuclear Technology Engineering Center directly support the high-level waste, spent nuclear fuel, and deactivation programs This program provides operations and maintenance of non-process services including utilities, facilities, roads/grounds, equipment/materials management, and custodial care. Crosscutting technical services at the Idaho Nuclear Technology Engineering Center, such as engineering, nuclear safety and management oversight, will also be provided.

Detail Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The Idaho National Engineering and Environmental Laboratory is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the "Accelerating Cleanup: Paths to Closure." Estimates for the remediation work were derived from the "Idaho National Engineering and Environmental Laboratory Cost Estimating Handbook", which uses approved rates based on historical work performed at the site. Army Corps of Engineers performed an independent review of the Environmental Management baseline at the Idaho National Engineering and Environmental Laboratory.			
HQNP-SI01-LT-ID / Security Investigations			
Funding will be used to perform new security investigations and re-investigations for non-Federal employees in accordance with DOE Order requirements for the Idaho site.			
HQNP-SI01-LT-ID	0	508	508

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-CTREXC-101 / Low-Level Waste/Mixed Low-Level Waste Center of Excellence

The Low-Level Waste/Mixed Low-Level Waste Center of Excellence (the Center) will analyze critical waste management issues, formulate effective solutions with respect to those issues, and assist the Department of Energy Headquarters in establishing policies, which are put into practice by the Department of Energy low-level waste and mixed low-level waste programs nationwide.

- Activities are being curtailed in FY 2000, due to overall budget constraints and other higher priority efforts.

ID-CTREXC-101	498	395	0

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-ER-102 / Test Reactor Area Remediation (WAG 2)			
This project provides for the assessment and remediation of the Test Reactor Area as required by the Federal Facilities Agreement/Consent Order and the Comprehensive Environmental Response, Compensation and Liability Act at the Idaho National Engineering and Environmental Laboratory.			
■ Complete Operable Unit 2-13 field remedial action under comprehensive Record of Decision including regulatory inspection and certification of field remedial activities.			
■ Submit final Remedial Action Report for Operable Unit 2-13 to regulators for review and approval.			
■ Initiate long-term surveillance and monitoring activities at Operable Unit 2-13.			
ID-ER-102	1,647	2,893	1,660
Metrics			
Remedial Action/Release Site			
Assessments	15.0	0.0	0.0
Cleanups	7.0	0.0	6.0
ID-ER-103 / Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant) Activities (WAG3)			
This project is to complete assessment, remedial design/remedial action cleanup, and long-term monitoring and maintenance activities for the Idaho Nuclear Technology and Engineering Center (used for storage and reprocessing spent nuclear fuel.)			
■ In accordance with the Record of Decision issued in FY 1999, activities in FY 2000 are:			
■ Begin the Tank Farm Soils Interim Actions (Surface Water Controls).			
■ Provides for perched water recharge controls.			
■ Continue monitoring of the Snake River Plain Aquifer.			
■ Continue the separate tank farm Remedial Investigation/Feasibility Study.			
■ Initiate source control remediation.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete Remedial Design/Remedial Action Work Plan.			
■ Complete design and siting for the Idaho National Engineering and Environmental Laboratory Comprehensive Environmental Response, Compensation, and Liability Act Disposal Facility.			
The End State for Waste Area Group-3 is projected to be FY 2044. All contaminated soil areas will be remediated by FY 2006. Tank Farm Soils and soils under buildings will be under institutional controls to meet remedial action objectives. An interim remedy will be implemented at the Tank Farm by FY 2005 (limited contaminated soil removal and redirection of surface water infiltration). Remediation of the Tank Farm will follow the Tank Farm Remedial Investigation/Feasibility Study Record of Decision. Operations at the Waste Area Group will cease in FY 2035. Decontamination and decommissioning of buildings will be completed in FY 2044.			
ID-ER-103	2,995	11,404	13,815
Metrics			
Remedial Action/Release Sites			
Assessments	0.0	38.0	0.0
Cleanups	0.0	11.0	0.0

ID-ER-106 / Radioactive Waste Management Complex (WAG 7)

This project is to complete assessment and remediation activities for the Radioactive Waste Management Complex, which was an 88 acre burial ground for transuranic, radioactive, and hazardous waste. The site was in operation from 1952 to 1970. The focus of this project is cleanup of radioactive and hazardous contaminants in accordance with a 1993 Record of Decision; to continue work on the Remedial Investigation/Feasibility Study to be completed in March 2000; and complete a final Record of Decision for all of Waste Area Group 7 in December 2002. Located within the Radioactive Waste Management Complex is the one acre Pit 9 Site. Pit 9 has been selected to demonstrate the feasibility of retrieving and treating transuranic, radioactive, and hazardous contaminants from waste burial sites in accordance with a 1993 Interim Record of Decision. The Alternate Pit 9

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue operation of the Operable Unit 7-08 vadose zone vapor vacuum extraction project.			
■ Complete treatability studies for in-situ grouting and hot in-situ vitrification of radioactive waste.			
■ Continue collection and analysis of groundwater, perched water, and lysimeter water samples.			
■ Begin construction of the Pit 9 double enclosed retrieval structure.			
■ Begin procurement of major waste retrieval and treatment equipment, and structural components in support of Pit 9 assessment activities.			
■ Complete Pit 9 soil and contaminant treatability studies.			
■ Complete Alternate Pit 9 Stage I Remedial Action Report.			
■ Complete Alternate Pit 9 Stage II Remedial Design in support of Federal Facility Agreement and Consent Order milestones.			
ID-ER-106	39,053	23,700	7,013*
* The total FY 2000 funding for this effort is $50,013,000. $43,000,000 of Pit 9 uncosted carryover will be available to provide for the Pit 9 phased alternative approach.			

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

ID-ER-107 / Pit 9 Remediation (contract management)

As a result of the termination of the Pit 9 subcontractor, the project has since been restarted under a three-stage alternate approach. The work under the phased approach will be tracked under PBS ID-ER-106. Funding contained in this PBS supports ongoing legal activities resulting from the original Pit 9 subcontract termination.

- Continue support for project office as well as legal fees associated with Pit 9.

ID-ER-107	0	2,941	2,379

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
No quantifiable corporate performance measures are associated with this project			

ID-ER-108 / Site-wide Monitoring Area Remediation

Waste Area Group 6/10 consists of 38 potential release sites, which require assessment as stipulated in the Federal Facilities Agreement/Consent Order and Comprehensive Environmental Response, Compensation, and Liability Act. The Operable Unit 10-4 Record of Decision, to be submitted in July 1999, will describe the final remedial actions which must be performed at these sites. Funding supports all regulatory requirements and completion of all remedial activities by FY 2005.

- Provide general risk assessment support activities for all Waste Area Groups.
- Provide Hydrologic Data Repository Support.
- Complete Operable Unit 10-04 Idaho National Engineering and Environmental Laboratory Site-Wide Remedial Investigation/Feasibility Study Report.
- Complete Operable Unit 10-04 Comprehensive Idaho National Engineering and Environmental Laboratory Site-Wide Remedial Investigation/Feasibility Study Proposed Plan and submit for public comment.
- Complete Operable Unit 10-04 Remedial Design/Remedial Action scope of work.
- Complete Operable Unit 10-04 Remedial Design/Remedial Action field activities at six sites.
- Continue long-term site-wide monitoring of groundwater, ecological receptor, and unexploded ordnance sites
- Maintain instutional controls at potential unexploded ordnance sites.

ID-ER-108	3,386	3,529	6,144
Metrics			
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

ID-ER-109 / Remediation Operation

This activity provides program management and support for assessment and cleanup projects conducted under the Federal Facilities Agreement/Consent Order, the Decontamination and Decommissioning and Deactivation Program, and the Surplus Facilities Surveillance and Maintenance Project. The work scope for remediation operations provides for system planning and control, technical program integration, community relations, environmental/safety/health and quality planning and support, integrated project management reporting, cost engineering system management, configuration management and control, data management, decontamination and decommissioning program management and support, remedial designs/ remedial action program support, and Headquarters interface support, and the DOE Idaho remediation programmatic support. Other activities supported include: the State of Idaho's involvement in the remediation program required by the Federal Facility Agreement and Consent Order; technical data development by the United States Geological Survey; and the university research foundation support to DOE to address stakeholder concerns, as well as, technical support contracts and grants to Indian tribes.

These activities are necessary to support and manage cost-effective remediation, decontamination, decommissioning, and deactivation programs with State and stakeholder involvement using state of the art cleanup techniques.

- Continuation of program implementation responsibilities as defined in the planning descriptions in accordance with strategy for cost-effective program implementation.
- Implementation of the wide variety of remediation related technical scope, including preparation of regulatory documents, preparation of baselines, management of data systems, and support for environmental, health and safety, and quality control requirements.
- Support of State of Idaho under the Federal Facility Agreement and Consent Order.

ID-ER-109	14,955	19,872	14,984

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics
No quantifiable corporate performance measures are associated with this project

ID-ER-110 / Decontamination and Decommissioning

This project is to eliminate the hazards posed by inactive radiologically contaminated facilities at the Idaho National Engineering and Environmental Laboratory, which may cause risk to site workers and the environment. The program end date for this project is FY 2044.

- Complete the decontamination and decommissioning assessments at: Test Area North-609, Equipment Maintenance Shop; Test Area North-726, Hot Liquid Storage Vault; Test Area North-725, Exhaust Stack; Test Area North-647, Containment Storage Building; Test Area North-648, PREP; Test Area North-616, Liquid Waste Treatment Facility; Test Area North-704, Engineering Test Reactor Primary Filter Pit; Test Area North-705, Engineering Test Reactor Secondary Filter Pit; Test Area North-644, Heat Exchanger Building; Test Area North-755, Engineering Test Reactor Filter Pit Building; Test Reactor Area-655; Air Intake Building; Test Reactor Area-706, Delay Tanks; Test Reactor Area-643, Compressor Building; Test Reactor Area-760, Engineering Test Reactor Warm Waste Station; and Idaho Chemical Processing Plant-642, Hot Waste Pump House Pit (15) total.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete decontamination and decommissioning (removal of all hazardous and radioactive waste and dismantlement of buildings) of facilities at: Test Area North-609, Equipment Maintenance Shop; Test Area North-656, Change Room; Test Reactor Area-655, Air Intake Building, Test Reactor Area-704, Engineering Test Reactor Primary Filter Pit; Test Reactor Area-705, Engineering Test Reactor Secondary Filter Pit; Test Reactor Area-706, Delay Tanks; Test Reactor Area-755, Engineering Test Reactor Filter Pit Building; Test Reactor Area-760, Engineering Test Reactor Warm Waste Station; Test Reactor Area-660, Advanced Reactivity Measurement Facility; Chemical Processing Plant-642, Hot Waste Pump House Pit; Central Facility Area-716, Sewage Pit Septic Tank (11) total.			
ID-ER-110	7,374	5,339	7,866

Metrics			
Facilities Decommissioning			
Assessments	2.0	5.0	15.0
Cleanups	4.0	8.0	11.0

ID-HLW-101 / High-Level Waste Pretreatment

The mission of this project is to safely store and pretreat high-level waste and other waste stored or managed by the Idaho Nuclear Technology and Engineering Center High-Level Waste Program, including: high-level liquid waste, sodium bearing waste, calcined solid waste, debris, and filters. Debris and filter waste from the Idaho Nuclear Technology and Engineering Center area is treated to remove the hazardous constituents such that it can be disposed as low-level waste.

Via a modification to a Consent Order on hazardous waste management with the State of Idaho, the Department of Energy agreed to place the calciner in standby by the end of April 1999, pending completion of an Environmental Impact Statement on the path forward for treatment and disposal of the liquid sodium bearing waste and calcine. This Environmental Impact Statement also addresses closure of the Idaho Nuclear Technology and Engineering Center waste facilities.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Maintain calciner facility in standby while continuing to operate the evaporators and debris and filter treatment operations within the calciner facility			
■ Operate the High-Level Liquid Waste Evaporator to concentrate and reduce the volume of liquid stored in the tank farm.			
■ Transfer of liquid waste from generators in the Idaho Nuclear Technology and Engineering Center area and retooling of the piping system to segregate Resource Conservation and Recovery Act waste from non-Resource Conservation and Recovery Act waste. New waste discharged to the tank farm will be minimized, segregated, and treated for disposal as low-level waste.			
■ Continue surveillance and maintenance of the calcine bin sets. Maintain safe and compliant storage of calcine and liquid waste.			
■ Perform treatment of mixed low-level waste debris from the Idaho Nuclear Technology and Engineering Center prior to land disposal.			
■ Start up upgraded debris treatment operations.			
■ Operate the filter leach process to reduce stored backlog of 250 highly contaminated filters and projected inventory of newly spent filters prior to land disposal.			
■ Perform laboratory sample analyses to support process operations at the Idaho Nuclear Technology and Engineering Center waste facilities.			
■ Technology development (laboratory and pilot plant activities) of the methods recommended for final treatment of the liquid waste and calcine will continue but will increase as the focus shifts to a recommended technology.			
■ Initiate conceptual design for upgrades to the calciner to meet the new Environmental Protection Agency Maximum Achievable Control Technology Rule (to be implemented in FY 2002-2005) if a decision is made to select the calciner for pretreatment of the sodium-bearing waste.			
ID-HLW-101	40,038	38,546	38,751

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
High-Level Waste			
Treatment (m^3)	760.0	732.0	1,041.0
Storage (m^3)	9,367.0	9,062.0	8,085.0
Disposal (m^3)	0.0	0.0	0.0

ID-HLW-103 / High-Level Waste Treatment and Storage

This project is to design, construct, and operate the facilities needed to convert the pretreated waste and treat remaining liquid waste by 2035 to a final disposable form that is road ready to ship out of the State of Idaho. Calcined and remaining liquid waste requires additional treatment to be suitable for disposal in a geologic repository. The work performed under this project is for new facilities required to complete the high-level waste mission and for demonstration projects and other development work necessary to implement the selected technology(ies).

The Department of Energy is currently preparing an Environmental Impact Statement, which will determine the path forward on treatment and disposal of remaining liquid waste and calcine. The Environmental Impact Statement also addresses closure of the Idaho Nuclear Technology and Engineering Center's high-level waste facilities. The Environmental Impact Statement is analyzing a full range of reasonable options for treating the waste, including options that depend on resuming pretreatment of waste and those, which do not convert liquid waste to calcine. The Environmental Impact Statement treatment options look at various options for treatment and disposal of the waste, including vitrification, ceramification, radionuclide separation, grouting the low activity fraction of the waste, disposal in geologic repository, near surface disposal, above ground disposal.

- Issue the Record of Decision for the Idaho National Engineering and Environmental Laboratory High-Level Waste and Facility Disposition Environmental Impact Statement.
- Begin negotiating with the State of Idaho on the plan and schedule for treatment and disposal of the calcine.
- If immobilization technologies are selected in the Record of Decision, a conceptual design will be initiated.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Sample and analyze the calcine and the liquid waste in the tanks to provide characterization data This data is necessary for permitting current and future waste treatment facilities and for delisting petitions, which affects the acceptability of final waste form in a geologic repository.			
■ Perform scalable demonstration projects associated with radioactive waste minimization, the Maximum Achievable Control Technology offgas sampling, and high temperature operation of the calciner. These projects are necessary to meet new regulatory requirements and Settlement Agreement milestones. Higher temperatures are needed to operate the calciner to treat sodium bearing waste and increase throughput. Demonstration projects are needed to confirm the results of engineering studies that only minimal modifications are needed to operate the calciner at higher temperature.			
ID-HLW-103	18,312	13,053	24,674

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

ID-HLW-105 / Low Activity Waste Treatment

The purpose of this project is to close the tanks after treatment operations are completed in accordance with the requirements of the Resource Conservation and Recovery Act, and prior to final Comprehensive Environmental Response, Compensation, and Liability Act closure. The project includes development and demonstration of the method to treat and dispose of newly generated liquid waste to support tank closures.

By FY 2005, the Department of Energy will immobilize the tanks heels in place for two of the 300,000 gallon tanks in the high-level waste tank farm. This will be followed by the immobilization of tank heels and closure of three additional tanks by FY 2009, with the remaining tanks ready for closure by FY 2012. It is expected that grouting systems will be used to grout tank heels and to treat newly generated low-level liquid waste that would otherwise have been put into the high-level waste tank farm.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conceptual design for closure of the emptied tanks in the tank farm will be completed.			
■ Draft tank closure plans will be prepared and the public comment process initiated.			
■ Develop alternative methods for treating newly generated liquid waste.			
ID-HLW-105	0	2,108	5,712

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

ID-LRP-101 / Environmental Engineering and Science Center

Provides for activities under the Idaho Long-Range Plan, including complex-wide integration and systems engineering support.

- Funding is continued in the Defense Science and Technology Budget request for FY 2000.

ID-LRP-101	8,000	61	0

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-101 / Site-wide Landlord Operations

This project performs core functions for site-wide base support, facility upgrades, capital acquisitions, and facility disposal initiatives. Also included in this project is an initiative to demolish and dispose of surplus non-radioactively contaminated buildings and facilities that are deteriorating and pose a possible physical hazard to site personnel.

- Continue Emergency Preparedness, Seismic Monitoring, Environmental Monitoring, Integrated Planning Activities, and Meteorological Monitoring.
- Complete approximately 20 percent of backlog of maintenance and repair safety and health corrections items.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Purchase, install, and make fully operational all approved FY 1999 and prior general purpose/capital equipment acquisitions. The equipment is used for security, radiological monitoring, calibrations, telecommunications and maintenance, and supports environmental compliance, the Resource Conservation and Recovery Act, and Safety Requirements.			
■ Complete construction of five of eight previously approved general plant projects. The projects support telecommunications, fire suppression, emergency response, and emissions monitoring.			
■ Operation and maintenance of the Experimental Breeder Reactor-I National Monuments as required by the Historic Sites Act.			
■ Upgrade antiquated sitewide computer systems.			
■ Funding of the Citizens Advisory Board and Payments-in-Lieu-of-Taxes for state and county.			
ID-OIM-101	23,076	29,604	34,626

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-OIM-102 / Idaho Nuclear Technology and Engineering Center (Formerly Idaho Chemical Processing Plant) Infrastructure Operations

This project is to perform the core functions required by multiple and varied programs at the Idaho Nuclear Technology and Engineering Center (formerly the Idaho Chemical Processing Plant) including operation, nuclear safety engineering environmental compliance, maintenance of the non-process plant facilities and services; including utilities and plant-wide infrastructure. These core functions support other programs in meeting regulatory and the Idaho Settlement Agreement requirements relative to the High-Level Waste and Spent Nuclear Fuel Programs.

- Incorporate process efficiencies identified through activity-based cost estimating methodology.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Upgrade and repair utility and facility structures and systems.			
■ Provide the utilities, landlord services, roads and grounds, non-process facilities, nuclear safety, environmental compliance, and plant-wide infrastructure supporting the high-level waste, spent nuclear fuel, and facility deactivation programs.			
■ Maintain structural roof and interior/exterior building integrity.			
■ Provide crosscutting services such as nuclear safety analysis; environmental, safety and health oversight; and quality assurance to the facility deactivation, high-level waste, and spent nuclear fuel programs.			
■ Provide engineering, document control, and work control support to the various programs.			
■ Provide stewardship and management of special nuclear material.			
■ Install, implement, and maintain the Idaho Nuclear Technology and Engineering Center Computerized Maintenance System.			
■ Perform Russian Criticality Experiments.			
■ Implement plant-wide computer-based training and maintained plant-wide training requirements.			
■ Begin construction of the Chemical Processing Plant 606 upgrades - General Plant Project.			
■ Initiate conceptual design of two Line-Item Construction Projects: Cathodic Protection System and the Process Water Treatment System.			
■ Begin construction on the Telephone Switchgear Facility - General Plant Project.			
■ Provide safeguards and security for the stewardship of special nuclear material and spent nuclear fuel.			
■ Proper material management practices and safeguard and security measures would be provided to ensure that the special nuclear material contained in Chemical Processing Plant-651 Building is adequately protected and cared for per DOE Orders 5632.1c and 5500.3a.			
ID-OIM-102	51,240	60,165	51,283

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics

No quantifiable corporate performance measures are associated with this project.

ID-OIM-116 / Environmental Legacy Compliance (VCO)

This project will fund corrective actions required to bring the Idaho National Engineering and Environmental Laboratory into regulatory compliance with Resource Conversation and Recovery Act as directed by the State of Idaho Division of Environmental Quality and the Department of Energy. Seven items in the Voluntary Consent Order must be addressed by FY 2000, six of which are funded by Environmental Management, and one by the Office of Nuclear Energy.

- Complete Inadequate Hazardous Waste Determination on Test Reactor Area Legacy Waste and disposition of 25 percent of waste.
- Submit determination report for Active Hazardous Waste Tanks to be placed on permit or closed.
- Complete system identification for the Idaho Nuclear Technology and Engineering Center active systems. Complete system identification for remaining systems for tanks requiring Hazardous Waste Determination or Verification of empty.
- Transfer New Waste Calcining Facility to Chemical Processing Plant-601 D-Cell for Storage of Calcine and Calcine Handling Tools at New Waste Calcining Facility.
- Characterize Chemical Processing Plant-603 Basin Water Sand Filter and Demineralization System.
- Submit draft Resource Conversation and Recovery Act closure plan and schedule for Division of Idaho Environmental Quality review and the Department of Energy revision for Test Reactor Area-630.

ID-OIM-116	0	0	9,077

Metrics

No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

ID-SNF-101 / National Spent Nuclear Fuel Program

This project is to facilitate implementation of the Department of Energy's Spent Nuclear Fuel research, development, and testing of technologies for treatment, shipment, and disposal.

- Provide to the Office of Civilian Radioactive Waste Management all outstanding information on the Department of Energy's Spent Nuclear Fuel needed to issue the final Environmental Impact Statement for the repository and to support the preparation of a Nuclear Regulatory Commission license application by compiling information from all DOE spent nuclear fuel sites.
- Complete the electrometallurical treatment qualifications of product form for disposal.
- Continue core science and exploratory studies to ensure acceptance of DOE spent fuel by the DOE Office of Civilian Radioactive Waste Management.
- Support repository design to accommodate DOE spent fuel and EM specific requirements.

ID-SNF-101	21,952	26,092	14,275

Metrics			
Spent Nuclear Fuel			
Stabilized (MTHM)	0.5	0.0	0.0

ID-SNF-102 / Integrated Spent Nuclear Fuel Program

This project is to support compliance with the Idaho Settlement Agreement through program management and support, technology development, continued fuel receipts, and fuel shipments to other Department of Energy sites.

Beginning in FY 1999, the Foreign Research Reactor Spent Nuclear Fuel Program work scope was moved to ID-SNF-103 for improved operational coordination.

- Finalize preparations for shipping and receipt of spent nuclear fuel from West Valley, beginning in FY 2001, in support of agreement with the New York State regulators.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Initiate negotiations with the regulators in December 1999 to establish a schedule to transfer all spent nuclear fuel out of wet storage.			
■ Provide technology development to support Spent Nuclear Fuel transfers to dry storage and ultimate out-of-State disposal.			
■ Provide Spent Nuclear Fuel data to the National Spent Nuclear Fuel Program to support repository Environmental Impact Statement and license application.			
ID-SNF-102	20,683	9,159	7,689

Metrics

This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

ID-SNF-103 / Emptied Spent Nuclear Fuel Facilities

This project is to remove all spent nuclear fuel from the following facilities at the Idaho National Engineering and Environmental Laboratory: Chemical Processing Plant-603 and Chemical Processing Plant-666 underwater basin storage; Test Area North underwater pool and dry pad storage; Chemical Processing Plant-749 Dry Storage Facility; Irradiated Fuel Storage Facility; Department of Energy Dry Storage Facility; and Privatized Dry Storage Facility. This project also manages the receipt of Foreign Research Reactor spent nuclear fuel in support of the United States non-proliferation policy.

- Continue the receipt of the Naval and Advanced Test Reactor Spent Nuclear Fuel.
- Continue removal of the Three Mile Island-2 fuel from wet storage with planned completion in FY 2001 per the Idaho Settlement Agreement.
- Continue wet spent nuclear fuel storage in the Chemical Processing Plant-666, while awaiting future dry storage.
- Complete transfer of spent nuclear fuel from first to second generation storage at the Chemical Processing Plant-749.
- Continue to receive shipments of foreign research reactor spent nuclear fuel and perform associated stakeholder activities.

54-291 99-65

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Funding provides for planning, inspections, and site preparations for future receipts in execution of the Foreign Research Reactor Spent Nuclear Fuel Environmental Impact Statement Record of Decision. These foreign research reactor spent nuclear fuel returns are a critical part of the Department's effort to support the United States non-proliferation policy.			
ID-SNF-103	29,524	37,920*	30,601*

* In addition to this funding, the Department's Cost of Work for Others program includes $3,100,000 in FY 1999 and $1,800,000 in FY 2000 of revenues received for the Foreign Research Reactor receipt program at Idaho.

Metrics			
Spent Nuclear Fuel			
Stabilized (MTHM)	0.0	6.0	53.1

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
ID-WM-105 / AMWTP Production Operations			
The Idaho Settlement Agreement requires a minimum of 3,100 m^3 of stored transuranic waste to be shipped out of the state by December 2002 (discussed under ID-WM-103 in the Defense Site/Project Completion Budget account). The approximately 61,900 m^3 of stored transuranic waste remaining will be treated in the privatized Advanced Mixed Waste Treatment Project to meet the Waste Isolation Pilot Plant waste acceptance criteria or other appropriate disposal facility requirements before it is shipped for disposal. This project supports Phase I of the Advanced Mixed Waste Treatment Project, including preliminary facility and process design activities; environmental regulatory permitting; National Environmental Policy Act evaluation; the Department of Energy Environment, Safety and Health Authorization; other project/technical support; and Phase III of the project, which includes payments to the vendor for operating the facility after construction. The capital asset acquisition of the Advanced Mixed Waste Treatment Project (ID-WM-104) is discussed in the Defense Environmental Management Privatization Budget account. All stored transuranic waste is planned to be removed from Idaho by December 31, 2015, but no later than December 31, 2018, as required by the Idaho Settlement Agreement. The Advanced Mixed Waste Treatment Project will treat mixed waste streams identified in the Idaho National Engineering and Environmental Laboratory Site Treatment Plan required by the Federal Facility Compliance Act of 1992. The Advanced Mixed Waste Treatment Project will undergo decontamination and decommissioning and the Resource Conservation and Recovery Act closure after scheduled completion of treatment in FY 2015, unless DOE extends the contract to treat additional Idaho National Engineering and Environmental Laboratory and non-Idaho National Engineering and Environmental Laboratory waste.			
■ Provides for project and technical support for the Advanced Mixed Waste Treatment Project, for Phase II (construction) efforts.			
ID-WM-105	3,212	8,610	527

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics

This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

ID-WM-106 / Site-wide Environmental Protection

This project is responsible for implementing programs that are mandatory for environmental compliance at the Idaho National Engineering and Environmental Laboratory. This project provides and interprets data needed to ensure protection of human health and the environment. Compliance with regulations is achieved by interpreting the regulations and their impact on the Idaho National Engineering and Environmental Laboratory, providing site-wide guidance, preparing permit applications for well drilling activities, ponds, storm water, air, establishing monitoring/surveillance programs for air, water, soils, and biota, preparing the required reports and maintaining project files according to Quality Assurance Management System.

- Support environmental, safety, health, quality, and risk Assessments and audits.
- Perform independent oversight and monitoring of the Idaho National Engineering and Environmental Laboratory operations via the State of Idaho and monitoring and surveillance of water and air quality by the U.S. Geological Survey; pursue cooperative research opportunities.
- Submit the Wastewater Land Application Annual Report summarizing sample results and operational performance, National Pollution Discharge Elimination System Discharge Monitoring Report summarizing storm water discharges, the National Emission Standards for Hazardous Air Pollutants Annual Report compiling radiological air effluent releases, and the Lockheed Martin Idaho Technology Company Site-wide Environmental Monitoring Report summarizing site-wide environmental monitoring activities, and drinking water reports.
- Submit the annual State of Idaho Well Permit Application.
- Environmental monitoring activities to support DOE Orders 5400.1 and 5820.2a will be completed.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The floodplain assessment required by 100 CFR 1021 and 1022 will be completed.			
ID-WM-106	5,176	6,988	7,508

Metrics
No quantifiable corporate performance measures are associated with this project

ID-WM-108 / Integrated Waste Operations Program

This project defines technical, regulatory, and integrating initiatives targeting cost efficiencies that could not be achieved within the individual projects. This project includes those activities that crosscut all other waste management projects. This project also provides funding for waste operations, technical, regulatory, projects integration, safety and health corrective action plans and integrated data management.

- Maintain the Site Treatment Plan mixed waste inventory and hold quarterly Idaho National Engineering and Environmental Laboratory and State of Idaho meetings.
- Add new off-site mixed waste streams to the Idaho National Engineering and Environmental Laboratory Site Treatment Plan and complete mixed waste treatment arrangement.
- Perform preventative maintenance on packaging; renew Certificates of Compliance; complete study for a single packaging custodian for the Idaho National Engineering and Environmental Laboratory; and provide engineering support for shipments of all waste types and spent nuclear fuel.
- Update the "Accelerating Cleanup: Paths to Closure" document, as necessary, to reflect changes to the management baseline.
- Develop and implement the Idaho National Engineering and Environmental Laboratory Integrated Waste Tracking System to track site-wide waste inventory.
- The Environmental Monitoring and Oversight Agreement with the State of Idaho, the Environmental Research Foundation, the Citizens Advisory Board, the Environmental Permitting with the State of Idaho, and funding for the United States Geological Survey will be provided.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The transportation consolidated management function will be funded.			
ID-WM-108	13,259	14,159	12,161

Metrics
No quantifiable corporate performance measures are associated with this project

Total, Idaho	304,380	317,046	291,253

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQNP-SI01-ID / Security Investigations	
■ No change in FY 2000.	0
ID-CTREXC-101 / Low-Level Waste/Mixed Low-Level Waste Center of Excellence	
■ Decrease reflects no FY 2000 activity.	-395
ID-ER-102 / Test Reactor Area Remediation (WAG 2)	
■ Decrease in funding is due to decrease in activity as project nears completion.	-1,233
ID-ER-103 / Idaho Chemical Processing Plant Activities (WAG 3)	
■ Increase reflects moving from Pre-Record of Decision, (preparation of documents) to actual remediation.	2,411
ID-ER-106 / Radioactive Waste Management Complex Activities (WAG 7)	
■ Reflects implementation of alternate Pit 9 activities. Funding supports purchase of major waste retrieval and treatment equipment as well as building components, material handling cells, and off-gas system and filters. The decrease in FY 2000 funding will be offset by the use of prior year funding of $43,000,000 that was originally appropriated for this work scope.	-16,687
ID-ER-107 / Pit 9 Remediation	
■ Decrease reflects reduced program support funding. As a result of the termination of the Pit 9 subcontractor, this remediaiton project has been restarted under PBS ID-ER-106 using a three stage alternate approach.	-562

	FY 2000 vs. FY 1999 ($000)
ID-ER-108 / Site-wide Monitoring Area Remediation	
■ Increase in funding reflects increase in a number of sites to be evaluated and native American concerns with economic risk.	2,615
ID-ER-109 / Remediation Operations	
■ Decrease reflects program now devoted to remediation versus assessment activities; and curtailment of other activities such as the National Recognition and New Business Development initiate, as cost savings measures.	-4,888
ID-ER-110 / Decontamination and Decommissioning	
■ Increase will allow ten additional assessments and decommissioning of three facilities.	2,527
ID-HLW-101 / High-Level Waste Pretreatment	
■ The increase will expedite debris treatment operations and increase processing of contaminated filters.	205
ID-HLW-103 / High-Level Waste Treatment and Storage	
■ Increase includes projected ramp up of work associated with technology demonstration and conceptual design associated with selected technologies.	11,621
ID-HLW-105 / Low Activity Waste Treatment	
■ Increase to begin accelerated conceptual design for closure of waste tanks and develop alternative methods for treating newly generated liquid waste.	3,604
ID-LRP-101 / Environmental Engineering Center	
■ Funding for FY 2000 is requested in the Defense Science and Technology Budget request.	-61
ID-OIM-101 / Site-wide Landlord Operations	
■ Increase includes funding for the facility disposal initiative, business systems upgrade, and environmental compliance corrective activities.	5,022
ID-OIM-102 / Idaho Nuclear Technology and Engineering Center (formerly Idaho Chemical Processing Plant) Infrastructure Operations	
■ Decrease reflects completion of several projects, shift in surveillance and maintenance requirements, and reduced funding for training.	-8,882
ID-OIM-116 / Environmental Legacy Compliance (VCO)	
■ Increase provides for additional corrective actions required to bring the Idaho National Engineering and Environmental Laboratory into regulatory compliance.	9,077

	FY 2000 vs. FY 1999 ($000)
ID-SNF-101 / National Spent Nuclear Fuel Program	
■ Decrease reflects peak in FY 1999 of workscope to provide information on DOE Spent Nuclear Fuel activities for the Office of Civilian Radioactive Waste Measures repository viability assessments Environmental Impact Statement and Nuclear Regulatory Commission license application. Some work scope moved out to FY 2001.	-11,817
ID-SNF-102 / Integrated Spent Nuclear Fuel Program	
■ Reduced technology development associated with fuel transfers to dry storage and repository preparations.	-1,470
ID-SNF-103 / Emptied Spent Nuclear Fuel Facilities	
■ Decreased activities associated with the Chemical Processing Plant-603 as fuel transfers are completed and the facility is transferred to deactivation. Also, decreased fuel transfer preparations from Chemical Processing Plant-666 requiring extended underwater storage and decreased funding for Foreign Research Reactor fuel receipts due to reduced shipments and previously established receipt protocols and equipment and procedural standardization.	-7,319
ID-WM-105 / AMWTP Production Operations	
■ Decrease reflects completion of all Phase I activities in FY 1999, leaving only minimal requirements for project and technical support during Phase II (construction) efforts.	-8,083
ID-WM-106 / Site-wide Environmental Protection	
■ The increase supports the Idaho National Engineering and Environmental Laboratory in performing additional Clean Air Act Title V permitting and environmental monitoring activities, negotiations or regulatory interpretations with the State of Idaho, and flood plains assessments required under 10 CFR 1021 and 1022.	520
ID-WM-108 / Integrated Waste Operations Program	
■ Decrease reflects completion of safety and health corrective action plans, stemming from the July 1998 Idaho National Engineering and Environmental Laboratory worker fatality.	-1,998
Total Funding Change, Idaho	-25,793

Major Issues

- Delay in opening the Waste Isolation Pilot Plant for receipt of mixed transuranic waste jeopardizes Idaho's ability to meet the Settlement Agreement Milestones to ship 3,100 cubic meters of transuranic waste out of Idaho by December 31, 2002.
- To meet the Settlement Agreement, DOE spent fuel must be included in the Nuclear Regulatory Commission license application for High-Level Waste/Spent Fuel Repository being submitted by the Post 2006 National Spent Fuel Program. Adequate funding must be provided in FY 2000 to support this activity.
- Idaho's budget request is compliance-based. Only minimal mortgage reduction activities will be funded in the FY 2000 request, requiring a continued high-level of surveillance and maintenance (costs) for abandoned (contaminated) facilities.

2056

Nevada

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management, Post 2006 Completion program, carried out by the Nevada Operations Office, is to characterize and perform corrective actions, as applicable, at inactive sites and facilities contaminated as the result of historic nuclear testing activities conducted at the Nevada Test Site, Tonopah Test Range, and Nellis Air Force Range in Nevada, and eight other locations in five states: Amchitka Island in Alaska, Rulison and Rio Blanco in Colorado; Salmon in Mississippi; Central Nevada Test Area and Project Shoal in Nevada; and Gasbuggy and Gnome Coach in New Mexico. The mission at the Nevada Test Site also includes the treatment, storage, and/or disposal of radioactive low-level waste, mixed low-level waste, transuranic waste, mixed transuranic waste, hazardous legacy wastes, and wastes generated as the result of the Department's activities across the complex

Program Goal

The Nevada Operations Office is committed to ensuring its site and activities pose no undue risk to the public and worker safety; and to maintain compliance with applicable environmental and other requirements. Planned actions are designed to address the Department's environmental mortgage by characterizing and performing applicable corrective actions at the Nevada Test Site and associated off-site locations, enhancing strategies to safely accept and dispose of low-level waste, removing stored transuranic and mixed waste for disposition, and closing on-site disposal areas in compliance with regulatory requirements. For contaminated surface sites outside the Nevada Test Site, Nellis Air Force Range, and the Tonopah Test Range boundaries, the goal is to characterize, perform applicable corrective actions, and restore the surface areas for alternative uses and/or relinquish to the Bureau of Land Management by the end of FY 2006. Institutional control of the subsurfaces will be retained by the Department of Energy and the ground water will be monitored for up to 100 years to ensure there is not risk to the public.

Program Objectives

The objective of the Nevada Operations Office Environmental Management Program is to address the legacy of contamination resulting from approximately 1,054 above and below-ground nuclear tests, of which 928 occurred at the Nevada Test Site. The test site will be remediated consistent with an end state which incorporates cleanup standards developed for an institutional land use scenario, with the expectation that the land will remain under the control of the government. Nine Environmental Management Program elements (four Environmental Restoration, three Waste Management, Agreements-in-Principles/Grants, and Program Integration) have been developed to characterize and remediate, as applicable, inactive sites and facilities and for waste management operations.

The environmental restoration program includes the Soils Project which addresses radiologic contamination in the surface soils. The Underground Test Area Project, which addresses subsurface contamination and groundwater protection, remains the highest priority activity within the Nevada Operations Office Environmental Management Program. The Underground Test Area Project end state is the implementation of a comprehensive groundwater model and monitoring network to assure that groundwater protection is achieved. The Industrial Sites Project addresses contamination resulting from use of support facilities such as leach fields, muck piles, sumps, and injection wells. Decontamination and Decommissioning activities, conducted as part of the Industrial Sites Project, will be completed within ten years. The Offsites Project addresses contamination resulting from historic testing activities which occurred at eight sites in five states (Arkansa, Colorado, Missouri, New Mexico, and Nevada).

The waste management program will continue to characterize, segregate, and repackage the transuranic /mixed transuranic waste at the Waste Examination Facility in anticipation of shipping the waste to the Waste Isolation Pilot Plant for disposal. Transuranic waste shipments are scheduled to begin in FY 2000. The balance of the Waste Management Program addresses the treatment, storage, and/or disposal of mixed low-level and low-level wastes. Nevada will continue to accept and dispose of low-level waste from off-site and on-site generators.

Agreements-in-Principle/Grants provide funding for state oversight activities and support of Department initiatives. Program Integration includes those activities common to all projects including quality assurance, health and safety, project planning and control, technical and regulatory support, and contractual support.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by site table; as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Completed characterization (FY 1998) and initiate remediation of Clean Slate 2 Plutonium Dispersion Site (FY 1999).
- Completed Frenchman Flat Contaminant Boundary Modeling (FY 1998) and complete Containment Boundary Report and Correction Action Decision Document (FY 1999).
- Completed Western Pahute Mesa Corrective Action Investigation Plan (FY 1998).
- Completed Final Bullion Forced Gradient Experiment Report (FY 1998).
- Completed construction of 6 drill pads and 35 miles of roads in support of deep ground water monitoring well installation on Nellis Air Force Range (FY 1998).
- Completed remediation of 15 Resource Conservation and Recovery Act industrial sites in FY 1998 and complete nine more in FY 1999 on the Nevada Test Site and Tonopah Test Range.

- Completed remediation of surface ground zero mud pits at the Project Salmon Site, MS (FY 1998) and complete subsurface Record of Decision (FY 1999).
- Negotiated and put in place a joint Department of Energy/State oversight agreement with the State of Nevada for the Department of Energy low-level waste disposal operations at the Nevada Test Site (FY 1998).
- Complete remediation of Clean Slate 1 Plutonium Dispersion Site (FY 1999).
- Initiate installation of four deep ground water monitoring wells for monitoring contaminated ground water flow toward Oasis Valley, Nevada from the Nevada Test Site (FY 1999).
- Completed ground water modeling effort at Amchitka Island, Alaska (FY 1999).
- Complete disposal of approximately 11,059 m^3 (FY 1998) and 37,742 m^3 (FY 1999) of the Department of Energy complex low-level wastes at the Nevada Test Site
- Complete treating approximately 15 m^3 (FY 1998) and 91 m^3 (FY 1999) of transuranic waste, making it disposal ready for shipment to the Waste Isolation Pilot Plant in New Mexico.
- Issue Draft Environmental Assessment on Internal Transportation of Low-Level Waste to the Nevada Test Site (FY 1998), which addresses stakeholder concerns associated with transportation through the populated Las Vegas corridor, for public review.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
NV202 / AIPs/Grants	3,736	3,473	4,068	595	17.1%
NV211 / Soils	1,460	6,056	5,696	-360	-5.9%
NV212 / Underground Test Area (UGTA)	20,277	29,009	33,236	4,227	14.6%
NV214 / Industrial Sites	13,000	10,800	11,405	605	5.6%
NV240 / Off-sites	3,933	7,036	8,634	1,598	22.7%
NV350 / TRU/Mixed TRU	5,628	5,141	6,483	1,342	26.1%
NV360 / Mixed Low-Level Waste	677	744	388	-356	-47.8%
NV370 / Low-Level Waste	5,542	5,420	5,864	444	8.2%
NV400 / Program Integration	14,665	12,402	9,533	-2,869	-23.1%
Total, Nevada	68,918	80,081	85,307	5,226	6.5%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Nevada Test Site	64,985	73,246	76,673	3,427	4.7%
Nevada Operations Office	3,933	6,835	8,634	1,799	26.3%
Total, Nevada	68,918	80,081	85,307	5,226	6.5%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	34.0	64.0	18.0
Cleanups	31.0	34.0	37.0
Facility Decommissioning			
Assessments	0.0	0.0	0.0
Cleanups	1.0	0.0	0.0
Deactivation	0.0	0.0	0.0
Transuranic Waste			
Treatment (m^3)	78.0	91.0	180.0
Storage (m^3)	671.0	671.0	394.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	0.0	0.0	277.0
Mixed Low-Level Waste			
Storage (m^3)	12.6	0.0	0.0
Treatment (m^3)	13.3	0.0	0.0
DOE On-site/Commercial/Disposal (m^3)	263.5	0.0	0.0
Disposal - Ship to DOE Disposal Site (m^3)	0.0	0.3	0.0
Low-Level Waste			
Disposal - DOE On-site/Commercial (m^3)	11,059.0	37,742.0	64,164.0

Site Description

Nevada Test Site

The Nevada Test Site is located 65 miles northwest of the city of Las Vegas and encompasses 1,350 square miles, an area roughly the size of Rhode Island. The activities are wide-spread, as well as geographically diverse, and are the result of approximately 1,054 historical above-ground and below-ground nuclear tests, which were conducted primarily at the Nevada Test Site. In addition to surface cleanup, the regional ground water model indicates a high potential for migration of underground contaminants toward public receptors.

The Nevada Test Site mission also includes safe storage and disposal of radioactive wastes generated by the Department of Energy activities throughout the complex. Storage of transuranic waste and disposal of low-level waste, the low-level wastes that are received from the on-site and off-site generators, are conducted according to the current Nevada Test Site Environmental Impact Statement Record of Decision and other regulatory requirements.

Detail Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Nevada Operations Office Environmental Management Program is managed through a performance-based management and operating contract and a cost-plus incentive fee architect-engineer service contract to assure the most cost efficient service to the Government. All supporting subcontracts are subject to an internal "make/buy" review process and have a fixed cost ceiling, requirements for safety and health, well-developed performance criteria, and specific quality standards. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Costs estimating, project planning and baseline methods, and project scope for the Environmental Restoration Program were independently validated by the Army Corps of Engineers and the Department of Energy's Core Technical Group in 1997. The Department of Energy's Core Technical Group completed similar activities for the Waste Management program in 1998. These validations include 100 percent of the projects described in this section, and the funds requested for FY 2000 are appropriate to perform the activities based on cost estimates developed using both historic costs for conducting similar activities and typical unit and time and materials costs found in private industry.

NV202 / AIPs/Grants

This project provides support for grants and various agreements with the states where the Department of Energy - Nevada Operations Office environmental management activities are occurring or are scheduled as the result of previous historical testing activities. Funding supports regulator oversight of the Nevada Operations Office activities within the states including surveillance and monitoring activities, and supports the outreach program, which include community involvement mechanisms, educational endeavors, and various research and development projects.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Funding of Agreements-in-Principle/Grants facilitates ongoing dialogue with regulators and stakeholder groups to develop common approaches and agreements if aggressive "Paths to Closure" goals are to be met. In many instances, funding provided through the Agreements-in-Principle is required for compliance with the Federal Facility Compliance Act and the Comprehensive Environmental Response, Compensation, and Liability Act. In other instances, the Agreements-in-Principle fund contractual agreements with various States to provide regulatory oversight, establish specific site sampling and monitoring requirements, and facilitate the undertaking of appropriate corrective actions. The grant programs fund stakeholder involvement and independent third-party oversight of the Department of Energy programs.			
NV202	3,736	3,473	4,068

Metrics
No quantifiable corporate performance measures are associated with this project.

NV211 / Soils

The Soils project addresses contaminated surface and shallow subsurface soils of the Nevada Test Site, the Tonopah Test Range, and the Nellis Air Force Range complex. Contamination is the result of the historic Department of Energy, Nevada Operations Office aboveground and near-surface nuclear detonations, safety shot tests, rocket engine development, and hydronuclear tests. The contaminations of concern are primarily americium, plutonium, depleted uranium as well as other transuranic, radionuclides, and fission products. In addition, there are potential sites where metals, particularly lead, will be of concern. The Soil Project will complete characterization of all sites comprising the project, complete remediation of surface soils to an established level and remediate only the hot spots located within sites identified as future testing zones at the Nevada Test Site, and maintain access control to the sites.

- Complete assessment of Clean Slates 3 Plutonium Dispersion Site; continue assessment and complete Corrective Action Investigation Plan for GMX Site; complete assessment of Project 57 Site.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Funding of Soils projects will focus on remediation sites outside the Nevada Test Site boundaries to reduce human health risks associated with exposure to radiological contamination. These activities result in reduced out year mortgage costs by eliminating the need for institutional control through site closure. Funding supports closure of sites prior to FY 2006.			
NV211	1,460	6,056	5,696

Metrics
No quantifiable corporate performance measures are associated with this project.

NV212 / Underground Test Area

The Underground Test Area Project focuses on the 921 underground nuclear detonations that were conducted in 88 shafts and tunnels on the Nevada Test Site between 1951 and 1992. The underground test areas have been grouped into six units, each of which is based upon geography and other elements common to the detonation locations. The six corrective actions units have contaminant sources that differ from each other and hydro geologic characteristics specific to their geographic location. Tritium is the contaminant of concern for the next 100 years, because it is the most mobile. Corrective action activities are required under terms of a Federal Facility Agreement and Consent Order negotiated by the Department of Energy and the Department of Defense with the State of Nevada. This agreement outlines the approach for identifying, prioritizing, investigating, and remediating the sites.

- Complete Corrective Action Investigation Plan for Yucca Flat; Complete installation of four deep ground water monitoring wells to monitor potential contaminant migration in the Oasis Valley area.
- Funding supports ground water monitoring wells modeling activities to assess the potential for contaminant migration as required by the Federal Facilities Agreement and Consent Order.

NV212	20,277	29,009	33,236

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action/Release Sites			
Assessments	0.0	10.0	0.0

NV214 / Industrial Sites

The Industrial Sites Project includes buildings, structures, equipment, and areas used in support of past nuclear testing activities. Within the Industrial Sites Project, there are approximately 456 remaining Corrective Action Sites that require some level of investigation; some Corrective Action Sites may require remediation. The Corrective Action Sites have been organized into over 256 similar groups or Corrective Action Units. The majority of the sites are located on the Nevada Test Site and some are located on the Tonopah Test Range. Site contaminants include chemicals, lead, explosives, unexploded ordinance items, and radioactive and mixed waste. The Project will complete characterization and required remedial actions and implement required monitoring activities at all sites.

- Complete Corrective Action Decision Documents for 7 Corrective Action Units on the Nevada Test Site and 2 Corrective Action Units on Tonopah Test Range; complete remediation of 1 Corrective Action Unit on the Nevada Test Site and 1 Corrective Action Unit on Tonopah Test Range.
- Funding supports characterization and remediation of various corrective action units as legally required by the Federal Facilities Agreement and Consent Order. Aggressive characterization will reduce or eliminate the need for remediation and post-closure expenditures at many sites, effectively reducing mortgage costs. Funding will accomplish the end state more quickly and cost-effectively and assure that the "Paths to Closure" goals are attained.

NV214	13,000	10,800	11,405

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action/Release Sites			
Assessments	34.0	8.0	18.0
Cleanups	27.0	34.0	3.0
Facility Decommissioning			
Cleanup	1.0	0.0	0.0
Building Not Yet Deactivated			

NV240 / Off-Sites

In addition to the Nevada Test Site, underground nuclear testing activities have been conducted at eight locations in five different states as part of the Nuclear Weapons Testing, the Vela Uniform, and the Plowshare Programs. Characterization of both the surface and subsurface environment will be conducted in order to minimize risk to the public and environment. If necessary, remediation activities will be conducted to allow release of the surface areas for alternative use and/or relinquished to the Bureau of Land Management. Subsurface areas will be modeled and monitored. Subsurface restrictions will remain in effect to prohibit access to radioactive contamination, and ground water will be monitored for a period of 100 years to ensure lack of access to contaminated ground water. Corrective actions of off-site locations within the State of Nevada are required under terms of an agreement negotiated with the state regulator. Parameters of corrective activities are identified within the Corrective Action strategy appendix to the agreement. Corrective measures are not established with the other four States, but are expected to parallel those established for the off-site locations within the State of Nevada. Cleanup levels required at each site will be negotiated with individual host states.

- Complete surface Closure Report and subsurface Corrective Action Plan for the Central Nevada Test Area, Nevada; initiate remediation of surface sites at the Project Salmon Site, Mississippi; continue long-term ground water monitoring at eight off-site test locations.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Funding supports characterization and remediation of various corrective action units as required by Agreements-in-Principle with the States of Nevada, Mississippi, and Alaska Access to these sites is largely uncontrolled and aggressive characterization supports timely assessment of site risk and supports releasing the surface areas for alternative use and/or relinquished to the Bureau of Land Management. Adequate characterization allows focused remediation and eliminates the need for remediation and post-closure expenditures at many sites. Funding will assure that the "Paths to Closure" goals are attained			
NV240	3,933	7,036	8,634

Metrics			
Remedial Action/Release Sites			
Assessments	0.0	46.0	0.0
Cleanups	4.0	0.0	34.0

NV350 / Transuranic Waste/Mixed Transuranic Waste

The Transuranic/Mixed Transuranic project will store, characterize, segregate, repackage, and ship transuranic and mixed transuranic waste for disposal at the Waste Isolation Pilot Plant in order to meet the requirements of the Resource Conservation and Recovery Act. The Rocky Flats waste stream must be declassified before it can be shipped to the Waste Isolation Pilot Plant for disposal Previously disposed transuranic and mixed transuranic waste in the Greater Confinement Disposal facility at the Nevada Test Site will be addressed in a Performance Assessment to determine the potential for future environmental and health risks. Planning, data collection, and analysis related to completion of the Performance Assessment, and subsequent permanent closure of the Greater Confinement Disposal facility, have been in progress in order to meet 40 CFR 191. Based on the results of this Performance Assessment, the Department of Energy will determine whether the waste may be closed in place or otherwise managed appropriately.

- Continue characterization and repackaging of transuranic/mixed transuranic waste in the Waste Examination Facility.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete radiography, radioassay, and headspace gas sampling of more than 50 percent of transuranic/mixed transuranic waste.			
■ Continue with preparation of disposal ready transuranic/mixed transuranic waste for future shipment to the Waste Isolation Pilot Plant.			
■ Finalize Greater Confinement Disposal Draft Performance Assessment; and continue with its internal peer review.			
NV350	5,628	5,141	6,483

Metrics			
Transuranic Waste			
Treatment (m^3)	78.0	91.0	180.0
Storage (m^3)	671.0	671.0	394.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	0.0	0.0	277.0

NV360 / Mixed Low-Level Waste

This project manages the Nevada Test Site's mixed low-level waste in accordance with the Nevada Test Site Federal Facilities Compliance Act, Site Treatment Plan, and Mutual Consent Agreement and to protect against potential risk to human health and the environment. Management of mixed low-level waste includes researching treatment options, selecting preferred and alternative treatment methods, verifying that the waste meets the applicable Waste Acceptance Criteria required by treatment and disposal site(s), shipping the waste to the selected site, and tracking the waste through disposal. The newly generated mixed low-level waste is stored temporarily as needed within the time frame negotiated with the State of Nevada pending treatment and disposal. Tracking, reporting, and coordination with the State of Nevada are accomplished by periodic meetings, annual updates, reporting of waste movement, and maintenance of database.

- Continue to interact with the State regulators for newly generated and legacy mixed low-level waste and manage them accordingly.

NV360	677	744	388

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	13.3	0.0	0.0
Storage (m^3)	12.6	0.0	0.0
Disposal Ship to - DOE Disposal Site (m^3)	0.0	0.3	0.0
Disposal - DOE On-site/Commercial (m^3)	263.5	0.0	0.0

NV370 / Low-Level Waste

This project operates and maintains a low-level waste disposal facility in a manner that ensures safety, efficiency, and compliance with all applicable regulations. It will accomplish cradle to grave tasks from the acceptance of low-level waste through closure of waste disposal units at the Nevada Test Site. The major activity is the disposal of low-level waste generated at the Nevada Test Site and other Department of Energy and Department of Defense sites, at two disposal units in Areas 3 and 5. With the natural conditions of closed desert basins, low rainfall, high aridity, great depths to ground water, and relatively slow movement of ground water off-site, the Nevada Test Site is ideally suited for this role as the disposer of the low-level waste. Supporting tasks include the on-site waste generator project, the integrated waste disposal units closure project, base operations and maintenance, technical support, routine site monitoring, maintaining performance assessments, site characterization, update the National Environmental Policy Act requirements general plant projects and capital equipment. The Nevada Test Site low-level waste disposal capabilities are anticipated to be needed through FY 2070 to support the remaining Department of Energy remediation efforts and other related radioactive waste generating activities. Disposal and permanent closure of specific filled disposal units will continue through FY 2070. Long-term surveillance and maintenance of disposal units will be conducted through FY 2100.

- Continue to dispose on-site and off-site generated low-level waste at the Nevada Test Site.
- All other low-level waste support work will continue.
- Update and maintain performance assessments for Areas 3 and 5 disposal sites.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Complete construction of closure cap for U3ax/bl disposal unit.			
■ Complete design of Post Closure monitoring, prepare construction package, and technical data collection for U3bh disposal unit.			
NV370	5,542	5,420	5,864

Metrics			
Low-Level Waste			
Disposal - DOE On-site/Commercial (m^3)	11,059.0	37,742.0	64,164.0

NV400 / Program Integration

Program Integration provides financial, professional, administrative, and crosscutting support of environmental management activities at the Nevada Test Site, Tonopah Test Range, and eight off-site locations in Alaska, Colorado, Mississippi, Nevada, and New Mexico. Overall management is most efficiently accomplished by integrating the functions that are common to all project activities. These functions include administrative support, strategic initiatives, budget formulation, project planning and control, baseline revision and maintenance, Quality Assurance, Health and Safety, and stakeholder involvement activities.

- In all years, provides for: Program Integration including the site strategic and program planning and integration, as well as program management and control. These activities include the Paths to Closure; Strategic Plans; Program and Project Plans; project and cost control systems; community and stakeholder meetings and workshops regarding DOE/EM activities; training; safety and health documentation; Operation and Maintenance Plans and Contingency Plans; quality assurance and self-assessment; maintenance of Performance Measurement System to support the Government Performance and Results Act; cost estimate reviews and cost validations; and local transportation planning.

NV400	14,665	12,402	9,533

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics No quantifiable corporate performance measures are associated with this project			
Total, Nevada	68,918	80,081	85,307

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
NV202 / AIPs/Grants	
■ Funding provided for continued implementation of the Federal Facilities Agreement and Consent Order activities with the State of Nevada, support of Agreements-in-Principle with three states, and community outreach and university research programs.	595
NV211 / Soils	
■ Reduction due to change in project priorities and completion of Clean Slates II in FY 1999.	-360
NV212 / Underground Test Area	
■ Increase reflects completion of installation of four deep ground water monitoring wells and beginning of sampling and analysis to determine potential migration of plutonium contaminents in the Oasis Valley.	4,227
NV214 / Industrial Sites	
■ Provides for acceleration and completion of activities including Area 2 U2-bu Subsidence Crater and Roller Coaster Rad Safe Area on Tonopah Test Range.	605
NV240 / Off-sites	
■ Provides for acceleration of surface cleanup activities at the Central Nevada Test Area.	1,598

	FY 2000 vs. FY 1999 ($000)
NV350 / TRU/Mixed TRU	
■ Increase expedites completion of waste characterization work to prepare transuranic waste for shipment to the Waste Isolation Pilot Plant.	1,342
NV360 / Mixed Low-Level Waste	
■ Decrease reflects completion of treatment and disposal of mixed low-level waste.	-356
NV370 / Low-Level Waste	
■ Reflects increased volumes of low-level waste disposed.	444
NV400 / Program Integration	
■ Decrease reflects elimination of funding provided for the Community Advisory Board activities, innovative cleanup technology implementation, and local emergency response and preparedness training programs due to budget constraints.	-2,869
Total Funding Change, Nevada	5,226

Oak Ridge

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Post 2006 Completion Environmental Management account, carried out by the Oak Ridge Operations Office is to direct and monitor environmental restoration, waste management operations, and materials stabilization activities on the Oak Ridge Reservation in Tennessee and at several off-site properties. The legacy waste at Oak Ridge includes 60 percent of the total the Department of Energy complex low-level waste inventory, 48 percent of the complex-wide mixed low-level waste inventory, and 80 percent of the total Department complex remote-handled transuranic waste inventory in storage at the three Oak Ridge sites. These large volumes, as well as all of the hazardous, sanitary, and industrial waste annually generated from mission activities, are safely stored, treated, and disposed in compliance with regulations. Spent nuclear fuel containing 0.25 metric ton of heavy metal is currently in storage at the Oak Ridge National Laboratory, awaiting transfer to the Idaho National Engineering and Environmental Laboratory and the Savannah River Site.

Program Goal

The Oak Ridge Operations Office is committed to have all spent nuclear fuel shipped to the Idaho National Engineering and Environmental Laboratory and the Savannah River Site for long-term storage by FY 2003, have all legacy transuranic waste treated and disposed by FY 2006, have all legacy mixed waste treated and disposed by FY 2008, have all remedial action sites completed by FY 2013, and have all legacy low-level waste disposed by FY 2019. The Oak Ridge Operations Office is further committed to ensuring its sites and activities pose no undue risk to the public and worker safety and maintain compliance with applicable environmental and other requirements.

Program Objectives

By FY 2006, all legacy transuranic waste will be treated and disposed, 95 percent of all legacy mixed waste will be treated and disposed, and 60 percent of all legacy low-level waste will be disposed. Additionally, Oak Ridge is involved in innovative technology demonstrations to identify more effective and efficient ways to treat waste. Remedial actions will be completed, including the Oak Ridge National Laboratory gunite tanks, cleanup of off-site properties, and an 85 percent reduction in the Environmental Management footprint of the Oak Ridge Reservation. These activities assume a cumulative enhanced performance efficiency of about 30 percent.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as, at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Awarded the innovative Management and Integration contract for the environmental management activities at the Oak Ridge, Paducah, and Portsmouth sites (FY 1998).
- Performed all necessary activities to compliantly treat, store, and dispose all applicable waste types at Oak Ridge (FY 1998/FY 1999).
- Awarded the commercial Broad Spectrum Mixed Waste Treatment procurement contracts (FY 1998).
- Awarded the Transuranic Privatization treatment contract (FY 1998).
- Completed three waste management line-item construction projects (FY 1998).
- Stabilized 0.032 m^3 (0.013 MTHM) of spent nuclear fuel in FY 1998 and 0.132 m^3 or 0.015 MTHM to stabilize in FY 1999.
- Completed all shipments (11 canisters) of aluminum clad fuel to the Savannah River Site (FY 1998).
- Retrieved and repackaged 15 canisters of spent nuclear fuel for shipment to the Idaho National Engineering and Environmental Laboratory (FY 1998).
- Award contract to construct and operate an on-site disposal cell for cleanup waste, pending regulatory approvals (FY 1999).
- Issue Phase I Record of Decision for the Bear Creek Valley Watershed.
- Issue decision documents to conduct removal actions for the Upper East Fork Poplar Creek plume and salvage yard projects.
- Eliminate 37 percent of the legacy mixed waste stored on the three Oak Ridge sites, and Paduch and Portsmouth (FY 1999).
- Complete removal of spent nuclear fuel from Facility 7823 (FY 1999).
- At the Oak Ridge Reservation, will commercially treat and dispose of 150 metric tons of hazardous waste, dispose of 68,000 m^3 of sanitary and industrial waste in the Department of Energy landfills on the Y-12 Plant site, treat over 1,949 m^3 of mixed low-level waste (14 percent of the total Oak Ridge Reservation inventory) and dispose of 4,749 m^3 (17 percent of inventory) of mixed low-level waste, treat over 2,378 m^3 of solid low-level waste and treat and dispose of over 286,000 m^3 of low-level and nonradioactive wastewater, and manage the safe storage of 2,539 m^3 of transuranic waste (FY 2000).

- Complete fabrication and testing of uranium conversion equipment at the Molten Salt Reactor Experiment at the Oak Ridge Reservation and complete planning, design, and documentation for the fuel salt removal process, which will lead to the removal and conversion of uranium in FY 2001, meeting a commitment to the Defense Nuclear Facility Safety Board under recommendation 94-1 (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-LT-OR / Security Investigations	0	661	563	-98	-14.8%
OR-38109 / Hazardous Waste Management	5,337	4,602	5,506	904	19.6%
OR-38110 / Sanitary/Industrial Waste Management	5,681	4,799	7,026	2,227	46.4%
OR-38111 / Mixed Low-Level Waste Management	100,375	66,311	73,706	7,395	11.2%
OR-38112 / Low-Level Waste Management	32,643	26,741	31,821	5,080	19.0%
OR-38113 / Transuranic Waste Management	12,746	17,824	13,766	-4,058	-22.8%
OR-42101 / Y-12 East Fork Poplar Creek Remedial Action	18,635	4,757	6,886	2,129	44.8%
OR-42102 / Y-12 Bear Creek Remedial Action	3,975	7,988	8,210	222	2.8%
OR-43101 / ORNL Melton Valley Watershed D&D - Defense	6,623	0	24,307	24,307	>999.9%
OR-43102 / ORNL Melton Valley Watershed Remedial Action - Defense	464	0	1,300	1,300	>999.9%
OR-43103 / ORNL Bethel Valley Remedial Action - Defense	833	0	28,569	28,569	>999.9%
OR-43104 / ORNL Bethel Valley D&D - Defense	0	0	3,629	3,629	>999.9%
OR-44103 / ETTP D&D - Defense	1,513	2,686	7,380	4,694	174.8%
OR-44105 / ETTP Landlord - Defense	6,432	24,721	24,681	-40	-0.2%
OR-48103 / Off-site RA - Defense	26,468	9,168	15,409	6,241	68.1%
OR-48104 / Directed Support - Defense	398	2,898	4,162	1,264	43.6%
OR-63101 / NMFS - Defense	2,702	3,600	7,640	4,040	112.2%
Total, Oak Ridge	224,825	176,756	264,561	87,805	49.7%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Reservation	190,039	164,029	186,622	22,593	13.8%
Oak Ridge National Laboratory	7,920	0	57,805	57,805	>999.9%
Off-Site	26,468	9,168	15,409	6,241	68.1%
Oak Ridge Operations Office	398	3,559	4,725	1,166	32.8%
Total, Oak Ridge	224,825	176,756	264,561	87,805	49.7%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	23.0	1.0	10.0
Cleanups	7.0	10.0	0.0
Facility Decommissioning			
Assessments	0.0	0.0	2.0
Cleanups	1.0	0.0	0.0
Transuranic Waste			
Storage (m^3)	2,343.0	2,384.0	2,539.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	0.0	0.0	0.0
Mixed Low-Level Waste			
Treatment (m^3)	2,763.0	4,080.0	1,949.0
Storage - Total (m^3)	24,964.0	11,395.0	7,480.0
DOE On-site/Commercial Disposal (m^3)	1,914.0	4,834.0	4,749.0
Low-Level Waste			
Treatment (m^3)	3,358.0	2,212.0	2,378.0
Storage (m^3)	40,667.0	46,324.0	49,004.0
New Waste (m^3)	0.0	0.0	0.0
Ship DOE Disposal Site (m^3)	0.0	803.0	3,436.0
Disposal - On-site/Commercial Disposal (m^3)	1,278.0	1,167.0	1,345.0
Hazardous Waste			
Disposal - On-site/Commercial (MT)	0.0	150.0	150.0
Spent Nuclear Fuel*			

*Refer to the Non-Defense Environmental Managemet Appropriation.

Site Description

Oak Ridge Reservation

The Oak Ridge Reservation encompasses about 37,000 acres and is comprised of three facilities; the Y-12 Plant, which was a uranium processing facility and now dismantles nuclear weapons components and serves as the nation's storehouse for special nuclear materials; the East Tennessee Technology Park, which was a uranium enrichment facility and is now being transitioned through reindustrialization; and the Oak Ridge National Laboratory, which conducts applied and basic research in energy technologies and in the physical and life sciences.

East Tennessee Technology Park

The East Tennessee Technology Park site occupies 1,500 acres adjacent to the Clinch River, some 13 miles west of Oak Ridge, Tennessee. It was originally built as an uranium enrichment facility using uranium hexafluoride for Defense Programs. The majority of the 125 major buildings on the site are now inactive since uranium enrichment production ceased in 1985. The site is being transitioned to the private sector through reindustrialization. Most Oak Ridge legacy waste is stored the East Tennessee Technology Park and the Toxic Substances Control Act incinerator is operating on the East Tennessee Technology Park.

Oak Ridge National Laboratory

Activities carried out at the Oak Ridge National Laboratory historically have supported both the defense production operations and civilian energy research effort. This group of facilities requires cleanup resulting from a variety of research and development activities, which were supported from past DOE programs and many facilities were supported by multiple programs over a long period of time.

The Oak Ridge National Laboratory currently conducts applied and basic research in energy technologies and the physical and life sciences. Transuranic, mixed low-level, hazardous and sanitary, and industrial waste are managed at the three Oak Ridge Reservation facilities. Although the operations are different the waste generated from these operations is essentially the same.

Due to past efforts conducted, funding for annual assessment/cleanup has been split between two appropriation accounts and in FY 2000 the majority of support will be funded under the Defense Environmental Restoration and Waste Management Appropriation.

Y-12

The Y-12 site is approximately 811 acres and is located about two miles southwest of Oak Ridge, Tennessee. The Y-12 has 15 operable units within three areas; Chestnut Ridge, Upper East Fork Poplar Creek, and Bear Creek Valley. The types of contamination include radioactive, hazardous, and mixed wastes. The West End Treatment Facility treats organic liquid waste produced by the Defense Programs. The sanitary landfills for all of the Oak Ridge sites operate at Y-12.

Off-site

The Off-Site Program is not on the Oak Ridge Reservation and includes the Lower East Fork Poplar Creek, the Clinch River/Poplar Creek, the Atomic City Auto Parts Site, the Oak Ridge Tool and Engineering Site, and the David Witherspoon Site. All waste types are stored, treated, and disposed in compliance with regulations.

Oak Ridge Operations Office

The Oak Ridge Operations Office manages, coordinates, tracks, and assists in the implementation of the Environmental Management program among the various sites. Oak Ridge is the lead site for the National Metal Recycle Program and supports crosscutting integration efforts related to the Oak Ridge sites. In addition, the Oak Ridge Operations Office manages oversight agreements with the State of Tennessee, Ohio, and Kentucky and provides funding for all off-site projects.

Detail Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Oak Ridge Operations Office is managed through an incentivized management and integration contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site, except for the low-level waste management operations, as outlined in the "Accelerating Cleanup: Paths to Closure." The projects included in this section of the budget have had an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities based on awarded fixed-price contracts.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
HQNP-SI01-LT-OR / Security Investigations			
Funding will be used to perform new security investigations and re-investigations for non-Federal employees in accordance with DOE Order requirements for the Oak Ridge ETTP site.			
HQNP-SI01-LT-OR	0	661	563
Metrics			
No quantifiable corporate performance measures are associated with this project			
OR-38109 / Hazardous Waste Management			
This project, a key activity in the base program required by the Resource Conservation and Recovery Act Regulations, is to effectively manage the Oak Ridge Hazardous Waste Program. The three Oak Ridge sites generate about 150 metric tons of hazardous waste. This waste is disposed of commercially, as generated, in accordance with state regulations. There is no legacy hazardous waste. These activities are essential for the successful execution of the ongoing Defense Programs and Science Office missions.			
■ Treat and dispose of 150 metric tons hazardous waste, as generated.			
OR-38109	5,337	4,602	5,506
Metrics			
Hazardous Waste			
Commercial Waste (MT)	0.0	150.0	150.0
OR-38110 / Sanitary/Industrial Waste			
This project, a key activity in the base program required by state regulations, is to effectively manage the Oak Ridge Sanitary/Industrial Waste Program. The three Oak Ridge sites annually generate about 68,000 m^3 of sanitary and industrial waste. This waste is disposed as generated in the on-site Y-12 sanitary landfills in accordance with state regulations. There is no legacy sanitary/industrial waste. These activities are essential for the successful execution of the ongoing Defense Programs and Science Office missions.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Dispose of 68,000 m^3 of sanitary and industrial waste in the on-site landfills.			
■ Close Area IV of the landfill on the Y-12 site.			
OR-38110	5,681	4,799	7,026

Metrics
No quantifiable GPRA metrics are associated with the PBS.

OR-38111 / Mixed Low-Level Waste Management

This project is to perform all necessary activities to compliantly store, treat, and dispose of mixed low-level waste generated from three Oak Ridge sites (Oak Ridge National Laboratory, the Y-12 Plant, and the East Tennessee Technical Park) in accordance with the Oak Ridge Federal Facilities Compliance Act Site Treatment Plan and a Federal Facilities Compliance Agreement. The Toxic Substances Control Act incinerator annually treats about 1,000 m^3 of mixed waste. The commercial Broad Spectrum mixed waste contracts started treatment of up to 36,500,000 kg of legacy mixed waste from across the Department of Energy Complex in FY 1999. Treatment and disposal of Oak Ridge legacy mixed waste is expected to be completed by FY 2008. These activities are essential for the successful execution of the ongoing Defense Programs and Science Office missions.

- Treat 1,949 m^3 (8 percent of the total inventory) and dispose of 4,749 (18 percent) m^3.

OR-38111	100,375	66,311	73,706

Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	2,763.0	4,080.0	1,949.0
Storage (m^3)	24,964.0	11,395.0	7,480.0
On-site/Commercial Disposal (m^3)	1,914.0	4,834.0	4,749.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-38112 / Low-Level Waste Management			
Perform all necessary operational activities to compliantly store, treat, and dispose of solid low-level waste generated on the three Oak Ridge sites (Oak Ridge National Laboratory, the Y-12 Plant, and the East Tennessee Technology Park). These activities are essential for on-going Defense and Science Office missions.			
■ 2,378 m^3 of solid low-level waste will be treated.			
■ 286,000 m^3 of liquid low-level waste and 510,000 m^3 of nonradiological wastewater will be treated and disposed as generated.			
■ Dispose of 4,781 m^3 of solid low-level waste.			
■ Provide compliant operation of the Gaseous Waste Collection and Treatment System at the Oak Ridge National Laboratory.			
■ Process depleted uranium chips as generated on the Y-12 Plant.			
OR-38112	32,643	26,741	31,821

Metrics			
Low-Level Waste			
Treatment (m^3)	3,358.0	2,212.0	2,378.0
Storage (m^3)	40,667.0	46,324.0	49,004.0
Ship to DOE Disposal Site (m^3)	0.0	803.0	3,436.0
On-site/Commercial (m^3)	1,278.0	1,167.0	1,345.0

OR-38113 / Transuranic Waste Management

Perform all necessary activities to compliantly store and collect the Oak Ridge National Laboratory transuranic waste. These activities are essential for on going Science program mission. These activities are also required by the 49 Code of Federal Regulations, Department of Transportation regulations, Resource Conservation and Recovery Act, Toxic Substance Control Act, and to support the privatization contract. In FY 1998, awarded the privatization contract to treat and prepare transuranic waste for disposal in the Waste Isolation Pilot Plant by FY 2006.

■ Complete site utilities project to support the privatization contract.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Phase I of the privatization contract will be completed including treatment facility design, obtain all necessary licenses and permits, and submit all the National Environmental Policy Act analysis data.			
OR-38113	12,746	17,824	13,766
Metrics			
Transuranic Waste			
Storage (m3)	2,343.0	2,384.0	2,539.0

OR-42101 / Y-12 East Fork Poplar Creek Remedial Action

Conduct assessment, cleanup, and pre-decommissioning, surveillance and maintenance activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for mercury release, Dense Non-Aqueous Phase Liquids and other activities under the Comprehensive Environmental Response, Compensation, and Liability Act.

- The Upper East Fork Poplar Creek Record of Decision will be issued for approval.
- The Upper East Fork Poplar East End Dense Non-Aqueous Phase Liquid project construction and implementation will continue.
- Continue surveillance and monitoring support for decommissioning and remedial action sites.
- Continue support for Reduction of Mercury in Plant Effluents Program and Integrated Water Quality Program.

OR-42101	18,635	4,757	6,886
Metrics			
Remedial Action/Release Sites			
Assessments	1.0	1.0	10.0
Cleanups	4.0	2.0	0.0
Facility Decommissioning			
Assessments	0.0	0.0	2.0
Cleanups	1.0	0.0	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-42102 / Y-12 Bear Creek Remedial Action			
Conduct remedial action assessments and cleanup activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for uranium burial grounds and ground water and surface water release, as well as other activities under the Comprehensive Environmental Response, Compensation, and Liability Act.			
■ Receive approval on the Bear Creek Valley Watershed Remedial Design Work Plan.			
■ Initiate remediation of the Boneyard/Burnyard.			
■ Continue management and integration support of construction of the Environmental Waste Management facility (the Oak Ridge On-site Comprehensive Environmental Response, Compensation, and Liability Act disposal cell) for high volumes of low-level radioactive waste.			
OR-42102	3,975	7,988	8,210
Metrics			
Remedial Action/Release Sites			
Assessments	22.0	0.0	0.0
Cleanups	3.0	8.0	0.0
OR-43101 / ORNL Melton Valley Watershed D&D - Defense			
Conduct facility decommissioning activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the Comprehensive Environmental Response, Compensation, and Liability Act. This activity was funded in the Non-Defense Environmental Management Appropriation in FY 1999 at a level of $33,434,000.			
■ Continue operation of the reactive gas removal system to prevent gas buildup and maintain sub-atmospheric pressure in the Molten Salt Reactor Experiment off-gas system.			
■ Install and test the Molten Salt Reactor Experiment fuel salt removal system.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Complete treatment of the Molten Salt Reactor Experiment uranium from the reactive gas removal project and the deposit removal project using the new conversion system.			
■ Submit the final Removal Action Work Plan for the Old Hydro Fracture Facility Comprehensive Environmental Response, Compensation, and Liability Act removal action. Complete design and implement decontamination and decommissioning.			
■ Continue the Old Hydrofracture Pond/Tanks Remediation removal action implementation activities.			
OR-43101	6,623	0	24,307

Metrics
Metrics for FY 1998 - FY 2000 are reflected in PBS OR-43201 (Non-Defense Environmental Management Appropriation).

OR-43102 / ORNL Melton Valley Watershed Remedial Action - Defense

Monitor and conduct remedial action cleanup activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the Comprehensive Environmental Response, Compensation, and Liability Act. This activity was funded in the Non-Defense Environmental Management Appropriation at a level of $2,573,000.

- Coordinate the integrated water quality program for the Melton Valley Watershed.

OR-43102	464	0	1,300

Metrics
Metrics for FY 1998 - FY 2000 are reflected in PBS OR-43202 (Non-Defense Environmental Management Appropriation).

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-43103 / ORNL Bethel Valley Remedial Action - Defense			
Conduct remedial action assessments and cleanup and long-term surveillance and maintenance. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the Comprehensive Environmental Response, Compensation, and Liability Act. This activity was funded in the Non-Defense Environmental Management Appropriation in FY 1999 at a level of $18,473,000.			
■ Continue the sludge removal and transfer activities at the Gunite and Associated Tanks South Tank Farm.			
■ Continue the remediation of the radioactive waste tanks for the Oak Ridge National Laboratory Main Plant Inactive Tank Sub-Project.			
■ Complete the Plume Source Removal Action at the Corehole 8.			
■ Continue remedial action implementation of the Oak Ridge National Laboratory Main Plant Surface Impoundments. Contaminated sediments will be removed from the impoundments and prepared for disposal.			
■ Complete the Bethel Valley Watershed Record of Decision.			
OR-43103	833	0	28,569

Metrics
Metrics for FY 1998 - FY 2000 are reflected in PBS OR-43203 (Non-Defense Environmental Management).

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-43104 / ORNL Bethel Valley D&D - Defense			
Conduct facility decommissioning cleanups and pre-decommissioning surveillance and maintenance activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the Comprehensive Environmental Response, Compensation, and Liability Act. This activity has been funded in the Non-Defense Environmental Management Appropriation in FY 1998 and FY 1999 at $4,302,000 and $5,197,000, respectively).			
■ Initiate the decontamination and decommissioning of the Fission Project Pilot Plant.			
■ Continue routine surveillance and maintenance activities for surplus facilities at the Oak Ridge National Laboratory			
OR-43104	0	0	3,629

Metrics
Metrics for FY 1998 - FY 2000 are reflected in PBS OR-43204 (Non-Defense Environmental Management).

OR-44103 / ETTP D&D - Defense

Conduct pre-decommissioning surveillance and maintenance activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal regulations and DOE Orders for Health and Safety.

- Activities include routine pre-decommissioning surveillance and monitoring of the centrifuge facilities, which includes facility surveillance of major shutdown facilities to identify unacceptable environmental, safety, and health conditions and maintain utility systems; correction of hazardous material leaks, fire protection systems, and facility security, and management of hazardous materials.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Activities also include deactivation work in the centrifuge facilities. (The carryover facilities were not extensively used to enrich uranium for commercial utilities and have therefore been funded through the Defense Appropriation related to uranium enrichment privatization).			
OR-44103	1,513	2,686	7,380

Metrics
Metrics for FY 1998 - FY 2000 are reflected in PBS OR-44303 (Uranium Enrichment D&D Fund).

OR-44105 / ETTP Landlord - Defense

Conduct Landlord activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal regulations and DOE Orders for Health and Safety, and maintenance. This account also includes infrastructure support activities that had been funded through overhead accounts prior to FY 1999. This activity is split funded by the Defense Environmental Restoration and Waste Management and the Uranium Enrichment D&D Fund Appropriations (total funding $41,136,000).

- Related subtasks will be completed for the East Tennessee Technology Park infrastructure used to support Environmental Management Program activities including: the East Tennessee Technology Park Electrical Distribution System Reconfiguration and selected bridge refurbishment.
- Design, construction, and planning associated with roof replacements and heating, ventilation, and air conditioning upgrades.
- Issues associated with engineering evaluations for security, classification, piping supports, and other equipment support.
- Funds infrastructure activities including safeguards and security, utilities, Environment, Safety and Health Program, reindustrialization support, and fire protection.

OR-44105	6,432	24,721	24,681

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics No quantifiable corporate performance measures are associated with this project			
OR-48103 / Off-site Remedial Action - Defense Conduct cleanups, ground water remediation and provide technical support and conduct landlord activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal regulations and DOE Orders for Health and Safety, and maintenance. The activities are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the Comprehensive Environmental Response, Compensation, and Liability Act, and consistent with the milestones agreed with the State under the Tennessee Superfind Act. This activity is split funded with the Non-Defense Environmental Management Appropriation (total funding $15,809,000). ■ Continue work on the David Witherspoon Site 901 and 1630 sites and on the Atomic City Auto Parts Site. ■ Conduct subcontract closeout and work-force transition activities. ■ Conduct public affairs activities including support of the Site Specific Advisory Board.			
OR-48103	26,468	9,168	15,409
Metrics This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			
OR-48104 / Directed Support - Defense Additional directed support provides grants to the States of Tennessee and Kentucky through Agreements-in-Principles, formation of site specific advisory boards and through existing Federal Facility Agreements. ■ Provide funding for grants to the State of Tennessee through Agreements-in-Principle and Federal Facility Agreements.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide funding for the National Metal Recycle Center.			
■ Provide funding for other directed activities			
OR-48104	398	2,898	4,162

Metrics
No quantifiable corporate performance measures are associated with this project

OR-63101 / NMFS - Defense

The nuclear materials facility stabilization activities provides for the safe storage, packaging, and shipment of Spent Nuclear Fuel located at the Solid Waste Storage Area on the Oak Ridge Reservation. The Spent Nuclear Fuel inventory consists of .09 metric tons of heavy metal (MTHM) in aluminum-clad fuel to be shipped to the Savannah River Site by FY 1998 and .16 metric tons of heavy metal in stainless steel, zirconium, and graphite-clad spent nuclear fuel to be shipped to the Idaho National Engineering and Environmental Laboratory by FY 2003. In FY 2000, the requested level of funding will allow the planned project scope and schedule for the spent nuclear fuel program to be maintained and will resolve the Defense Nuclear Facilities Safety Board spent nuclear fuel storage vulnerability. The funding level being requested is appropriate for these activities based on the current baseline. This project is split funded with the Non-Defense Environmental Management Appropriation (total funding $9,937,000).

- Will retrieve and repackage the remaining 16 canisters of spent fuel for shipment to the Idaho National Engineering and Environmental Laboratory.
- Will install the remaining 12 liners in the 7827 facility completing the Defense Nuclear Facilities Safety Board vulnerability resolution.
- Continue deactivation and surveillance and maintenance activities for the isotope facilities previously funded under the Non-Defense Environmental Management Appropriation.

OR-63101	2,702	3,600	7,640

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics Metrics for FY 1998-FY 2000 are reflected in PBS OR-63201 (Non-Defense Environmental Management).			
Total, Oak Ridge	224,825	176,756	264,561

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQNP-SI01-LT-OR / Security Investigations	
■ Decrease in the estimated number of investigations to be processed.	-98
OR-38109 / Hazardous Waste Management	
■ The increase is due to expected hazardous waste generation increases from the Defense Programs and Science Offices, and increased waste generation activity in decontamination and decommissioning at the East Tennessee Technology Park.	904
OR-38110 / Sanitary/Industrial Waste Management	
■ The increase is due to closure of Area IV and opening of a new cell of the landfill at the Y-12 Plant site.	2,227
OR-38111 / Mixed Low-Level Waste Management	
■ The increase is due to the Broad Spectrum Treatment contracts becoming fully operational; and an increase in other new waste streams treatment; and increases in disposal operations.	7,395
OR-38112 / Low-Level Waste Management	
■ The increase is due to additional treatment and disposal of legacy waste. The increase also reflects restoration of the low-level waste base program activities that were significantly reduced in FY 1999.	5,080

	FY 2000 vs FY 1999 ($000)
OR-38113 / Transuranic Waste Management	
■ The decrease is due to the completion of the transuranic sludge transfer and road project in FY 1999, which supports the transuranic privatization contract. The decrease also reflects reduced FY 2000 Phase I privatization project funding requirements.	-4,058
OR-42101 / Y-12 East Fork Poplar Creek Remedial Action	
■ The increase is due to record of decision approval; increased surveillance and maintenance and the Dense Non-Aqueous Phase Liquid project construction and implementation.	2,129
OR-42102 / Y-12 Bear Creek Remedial Action	
■ No significant change.	222
OR-43101 / ORNL Melton Valley Watershed D&D - Defense	
■ This project is a net decrease (defense and non-defense). Less work has been planned for this project in FY 2000 in order to direct funding to compliance activities. In FY 1999 these activities are in the Non-Defense Environmental Management Appropriation at a level of $33,434,000.	24,307
OR-43102 / ORNL Melton Valley Watershed Remedial Action - Defense	
■ This project is a net decrease (defense and non-defense). Slightly less work has been planned for this project in FY 2000. In FY 1999 these activities are in the Non-Defense Environmental Management Appropriation at a level of $2,573,000.	1,300
OR-43103 / ORNL Bethel Valley Remedial Action - Defense	
■ This project is a net increase (defense and non-defense). Increased work includes sludge removal and transfer activities; remediated of the radiactive waste tanks for main plan inactive tank; and to complete plume source removal action at the Corehole 8. In FY 1999 these activities are in the Non-Defense Environmental Management Appropriation at a level of $18,473,000.	28,569
OR-43104 / ORNL Bethel Valley D&D - Defense	
■ This project is a net decrease (defense and non-defense). Less work has been planned for this project in FY 2000. In FY 1999 these activities are in the Non-Defense Environmental Management Appropriation at a level of $5,197,000.	3,629

	FY 2000 vs. FY 1999 ($000)
OR-44103 / ETTP D&D - Defense	
■ The increase is in scope of deactivation work at the Centrifuge Facility.	4,694
OR-44105 / ETTP Landlord - Defense	
■ No significant change.	-40
OR-48103 / Off-site Remedial Action - Defense	
■ The increase is due to the majority of activities being transferred to the Defense Environmental Restoration and Waste Management Appropriation in FY 2000; and additional contract transition activities.	6,241
OR-48104 / Directed Support - Defense	
■ The increase is due to increased Agreements-in-Principle and other directed activities and to provide funding for the National Center of Excellence for Metal Recycling.	1,264
OR-63101 / NMFS - Defense	
■ This increase is due to the final installation of the remaining new liners in the 7827 facility, which will complete the resolution of the spent fuel vulnerability identified by the Defense Nuclear Facilities Safety Board. Increase also reflects the majority of activities being transferred to the Defense Environmental Restoration and Waste Management Appropriation in FY 2000.	4,040
Total Funding Change, Oak Ridge	87,805

Richland

Mission Supporting Goals and Objectives

Mission

The Mission of the Hanford site, managed by the Richland Operations Office, is to protect the health and safety of the public, workers, and the environment; control hazardous materials; and utilize the assets (people, infrastructure, and site) for others missions. Under the Defense Environmental Management, Post 2006 Completion account, the site manages surface land and water, the Vadose Zone, groundwater, facilities, property and special nuclear materials inventories, for the purpose of cleaning up the contaminated material and preventing further contamination from reaching the Columbia River. The major site efforts included in this part of the budget are: the Tank Waste Remediation System project in the central plateau (200 Area) of the site; Environmental Restoration, including the decontamination and decommissioning of reactors and facilities in the 100 Area along the Columbia River, and the cleanup of the contaminated soil and water throughout the site; Waste Management activities which are primarily carried out in the 200 and 300 Areas of the site; management of the on site Analytical Laboratories and of Pacific Northwest National Laboratory, which provide services to the various cleanup efforts onsite; and the Landlord program, which maintains the site infrastructure, vital to the cleanup effort. The Hanford site is the nation's largest former nuclear weapons production site, and the Hanford cleanup project is the largest, most technically complex, environmental cleanup project yet undertaken.

Program Goal

The ultimate program goal for the Hanford site is to protect the Columbia River. There are several major efforts required to accomplish this goal. These efforts include: removal and treatment of waste now stored in 177 underground high level waste tanks; cleanup and safe disposal in the central area of the site of surface contamination along the Columbia River; monitoring, mitigation, and remediation of chemical and radioactive contaminants that have migrated into the vadose zone and groundwater beneath the site; management of large volumes of liquid and solid wastes generated as a result of site cleanup; and management of the site infrastructure for the duration of the cleanup, which will go on for many years. The efforts described above are governed by the Hanford Federal Facility Agreement and Consent Order, commonly referred to as the Tri-Party Agreement, which was negotiated among the Department of Energy, the State of Washington and the Environmental Protection Agency.

Many interim activities are being conducted to resolve the most urgent risks at the Hanford site. By 2006, Hanford plans to have all essential site infrastructure completed to support the privatization contractor's treatment facilities, upgrade tank retrieval systems, complete necessary upgrades of tank infrastructure and transfer lines, have storage facilities available for receipt of immobilized waste, and be prepared to deliver wastes to support hot operations of the privatized facilities. In succeeding years, Hanford will provide interim storage of the immobilized wastes treated by the privatization contractor. By 2018, approximately 10 percent of the wastes, involving about 25 percent of the highest risk wastes, will be treated and safely stored. Thereafter, the site will proceed with the second phase of the privatization effort.

Hanford also has a goal of cleaning up the contaminated soil and buildings to levels supportive of future use targets and/or to regulator specified levels as prescribed by the Comprehensive Environmental Response, Compensation, and Liability Act/Resource Conservation and Recovery Act decisions. Hanford intends to aggressively clean up the contaminated soil and buildings in the 100 and 300 Areas and dispose of remediation waste in the on site Environmental Restoration Disposal Facility. Hanford currently has 1,629 release sites awaiting remediation and 692 buildings and facilities awaiting decommissioning. Remediation actions will protect the Columbia River and near shore environment, reduce contamination entering the groundwater and control the migration of plumes that threaten groundwater quality.

In addition, Hanford will dispose solid wastes consistent with national policies for management of transuranic, low-level, low-level mixed, and hazardous wastes. Hanford will continue to receive onsite and off-site wastes for disposal in the 200 Area. Retrieved transuranic waste will be processed and shipped off-site to the Waste Isolation Pilot Plant.

Program Objectives

The near term program objective for the high-level waste tank farms is to perform interim stabilization of the remaining 29 single shell tanks by pumping their contents to safer, newer double shell tanks. Also, Hanford will close unreviewed safety questions, work toward closure of the waste level rise in tank SY-101, and complete the sluicing campaign in tank 106-C, resolving safety concerns with that tank.

The site will continue decontamination and decommissioning of surplus facilities including interim safe storage and final disposition of the 100 Area reactors. Contaminated material will continue to be excavated and disposed in the Environmental Restoration Disposal Facility. Cells 1 and 2 will be interim closed pending final closure of the Environmental Restoration Disposal Facility. The site will implement a science and technology roadmap for the Groundwater/Vadose Zone Integration program to support site assessment and remediation and system assessment capability development.

Hanford will continue processing transuranic and low-level mixed waste through the Waste Receiving and Processing facility and be ready to ship transuranic waste to the Waste Isolation Pilot Plant. Hanford will also continue to dispose of low-level mixed and low-level wastes, including low-level waste received from offsite generators Site support will continue to be provided including maintenance, upgrades, and replacement of the general purpose infrastructure required throughout the Hanford site

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as, at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Completed seven waste site remediations in the Hanford 100 Area in 1998 with 258,000 m^3 (534,000 tons) of soil removed, and in FY 1999, 29 more waste site remediation completions are scheduled with 171,225 m^3 (365,000 tons) of soil removed, thereby reducing risk of mixed low-level contamination from reaching the Columbia River and meeting the Tri-Party Agreement commitments. In FY 2000, 14 waste site remediations are scheduled, with 126,169 m^3 (277,766 tons) of soil removed, in addition to the completion of backfill of ten waste sites.
- Completed barrier testing in the Hanford 200 Area in FY 1998. In FY 1999, the 200 Area implementation plan will be completed thereby meeting the Tri-Party Agreement commitments
- Completed two waste remediations in the Hanford 300 Area with 53,917 m^3 (117,000 tons) of soil removed (FY 1998), and is scheduled to complete three more waste site remediations with 78,107 m^3 (162,895 tons) of soil removed in FY 1999, thereby reducing risk of mixed low-level contamination from reaching the Columbia River and meeting the commitments of the Tri-Party Agreement. In FY 2000, plan two waste site completions with 12,083 m^3 (24,600 tons) of soil to be sent to the Environmental Restoration Disposal Facility.
- The Environmental Restoration Disposal Facility received 308,295 m^3 (669,000 tons) of contaminated soils and debris resulting from site remediation and began the facility expansion with Cells 3 and 4 (FY 1998) and is scheduled to receive 254,859 m^3 (541,000 tons) of contaminated soil and debris and complete the expansion of Cells 3 and 4 (FY 1999), thereby safely storing the environmental restoration waste and meeting the commitments Tri-Party Agreement. In FY 2000, the interim closure of Cells 1 and 2 will be complete, and 142,181 m^3 (314,400 tons) of soil will be disposed of.
- The Facility Surveillance and Maintenance project completed stabilization of seven radioactive waste area sites preventing spread of contaminants, completed three corrective actions to specific facilities in 100 Area Risk Assessment corrective actions (FY 1998), and is scheduled to complete the stabilization of five waste sites, preventing spread of contaminants (FY 1999), thereby reducing environmental risk. In FY 2000, this project will continue surveillance and maintenance of surplus facilities and reactors as well as continuing the Canyon Disposal Initiative.

- The Hanford decontamination and decommissioning project completed the interim safe storage of 105-C Reactor and initiated the interim safe storage of 105-F and 105-DR Reactors (FY 1998) and is scheduled to continue the interim safe storage of 105-F and 105-DR Reactors (FY 1999), thereby reducing mortgage, reducing environmental risk, protecting the Columbia River, and meeting the commitments of the Tri-Party Agreement. In FY 2000, the project will continue decontamination and decommissioning of 233-S building, continue interim safe storage of 105-F and 105-DR reactors, and begin characterization of 224B facility.
- The ground water project continued operations of five pump and treat systems to reduce contamination and contain flow of plumes, and continued operation of the carbon tetrachloride vapor extraction system (FY 1998/FY 1999), thereby reducing the risk of low-level contamination from reaching the Columbia River, and meeting the commitments of the Tri-Party Agreement.
- The Hanford Site Groundwater/Vadose Zone Integration Project was established in FY 1998. This science-based project includes participation of the DOE national laboratories and incorporates peer review. Through 1998 the project has developed a Science and Technology Roadmap in cooperation with the Department of Energy national laboratories; established a nationally recognized Expert Review Panel; initiated, with the direct participation of stakeholders, definition of an assessment tool to address the impact of all Hanford Site wastes; and issued the draft project specification and long-range plan. In FY 2000, implementation of the science and technology roadmap to support site assessment and remediation and system assessment capability development will commence.
- Completed 16 Tank Characterization Reports and met all the Defense Nuclear Facilities Safety Board 93-5 commitments (FY 1998).
- Complete all Tank Characterization Reports required by the Tri-Party Agreement commitments and close the Defense Nuclear Facilities Safety Board Recommendation 93-5 (FY 1999).
- Closed organic complexant unresolved safety question for all tanks; resolved organic complexant safety issue; closed flammable gas unreviewed safety question for double-shell tanks and single-shell tanks; and provide annual update to Basis for Interim Operations of the Tank Farms (FY 1998).
- Resolve organic solvent safety issue; resolve high-heat safety issue; and resolve criticality safety issue (FY 1999).
- Complete negotiation of a Consent Decree for tank interim stabilization with the State of Washington This resolves the announced lawsuit (FY 1999).
- Issued regulatory guidance, completed review and approval of the Phase I-A submittals, and did a readiness-to-proceed (to Phase I-B) evaluation of both privatization contractors, evaluated vendors' conceptual design and issued decision to proceed to Part B, Phase I of the privatization contract; prepared the Privatization Authorization-to-Proceed package and documentation for Congressional Report to proceed with Phase I Privatization (FY 1998).
- The planned schedule of activities by the privatization contractor, BNFL, Inc., for treatment and immobilization of tank wastes has changed since the FY 1999 Congressional Budget Request. Accordingly, activities supporting privatization have being re-prioritized (PROGRAM SHIFT).

- Prepared documentation to support AP106/108 tank turnover to a privatization contractor, and issued Phase I Site Characterization Data Report (FY 1998).
- Submitted Project Management Plan for Immobilized Tank Waste Storage and Disposal Project to Washington State Department of Ecology (Tri-Party Agreement M-90-01); validated Immobilized Low Activity Waste project for grout vault modification; and initiated conceptual design for additional disposal capacity (needed when grout vaults reach capacity) (FY 1998).
- The Tank Waste Remediation System issued annual update on the Multi-Year Work Plan; completed the Tank Waste Remediation System technical baseline to support project design requirements; and issued draft Management Support Project transition plan (FY 1998).
- Complete demonstrations in preparation for delivery to the privatization contractor; additional vadose zone characterization will allow further definition of tank retrieval and closure requirements (FY 1999).
- Complete documentation for tank and land turnover to Phase I Privatization Contractor, finalize planning for construction of roads and decommissioning of a monitoring well that interferes with the Privatization Contractor's facility (FY 1999).
- Complete Immobilized Low Activity Waste Disposal Facility conceptual design and validate project for additional disposal capacity; establish processing parameters for incorporation of the vitrification of Cs/Sr capsule contents into Phase II Privatization scope; revalidate Immobilized High-Level Waste Storage project (FY 1999).
- Completed Replacement Cross-Site Transfer System (93-D-182), securing a compliant, double-contained cross-site transfer line meeting the Tri-Party Agreement milestones (FY 1998).
- Completed Tank Farm Ventilation Upgrade (89-D-173), and placed AY/AZ Tank Farm ventilation systems in service, meeting the Tri-Party Agreement milestones (FY 1998).
- Established and started implementation of planned interim stabilization of remaining 29 single shell tanks containing free liquids. Started pumping three tanks and completed pumping another; agreed to milestones with the State of Washington (FY 1998) resolving potential lawsuit.
- Completed expense funded construction of a project for sluicing tank C-106 and commence sluicing to remove high heat sludge.
- Initiated off-site shipment of mixed low-level waste to Idaho for thermal treatment (FY 1998).
- Completed shut-down of the Hanford railroad and transferred the 1100 area to the Port of Benton (FY 1998).
- Started operations of the Waste Receiving and Processing transuranic waste processing line (FY 1998), and have prepared about 20 m^3 of non-mixed transuranic waste ready for shipment to the Waste Isolation Pilot Plant for disposal (FY 1999).
- Provided 23,500 student days of Hanford safety and health training and conducted two large scale emergency response field exercises in the United States by leveraging other organization's training (FY 1998), and is scheduled to provide 24,000 more student days of Hanford training (FY 1999).

- Declassified 103,545 pages of documents after reviewing 209,866 pages and completed Nature Conservancy activities, (FY 1998); and scheduled to review 240,000 pages in FY 1999. Also in FY 1999, the program is scheduled to complete the Westinghouse Hanford contract closeout.
- The Landlord project deactivated three facilities, decommissioned twenty-two facilities, and monitored thirty-eight deactivated and ten active facilities. Two construction projects were completed: Water System Upgrade Reservoir (general plant funded) and 324 Facility Compliance/Renovation (95-D-454). Shut down two central steam plants, which reduced soil and air pollution by six hundred tons per year and reduced liquid effluent discharged to the ground by 57 million gallons (FY 1998).
- The Landlord project is scheduled to complete the disposal of four contaminated rail cars, deactivate fifty facilities and monitor forty deactivated and 400 active facilities. The 200-East Area Sanitary Water Effluent and 200-West Area Regional Drainfield projects are scheduled for completion, which will reduce over 12 million gallons of liquid effluent from being discharged to the soil column (FY 1999).
- The Tank Waste Remediation System issue annual update on the Multi-Year Work Plan; submit Project Baseline Summaries; upgrade Systems Engineering Management Plan; and update and issue final Management Support Project transition plan (FY 1999).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-LT-RL/Security Investigations	0	791	807	16	2.0%
RL-ER01 / 100 Area Remedial Action	12,074	22,054	26,111	4,057	18.4%
RL-ER02 / 200 Area Remedial Action	1,279	1,967	0	-1,967	-100.0%
RL-ER03 / 300 Area Remedial Action	6,819	7,809	6,296	-1,513	-19.4%
RL-ER04 / Environmental Restoration Disposal Facility	21,383	29,952	16,030	-13,922	-46.5%
RL-ER05 / Facility Surveillance and Maintenance	10,742	13,844	12,278	-1,566	-11.3%
RL-ER06 / Decontamination and Decommissioning	17,675	11,540	10,769	-771	-6.7%
RL-ER07 / Post Closure Surveillance and Maintenance	-10	59	60	1	1.7%
RL-ER08 / Ground Water Management	20,603	19,152	19,394	242	1.3%
RL-ER10 / Program Management and Support	31,302	32,923	32,837	-86	-0.3%
RL-HM01 / HAMMER	4,883	5,800	5,900	100	1.7%
RL-OT01 / Mission Support	22,857	26,180	25,866	-314	-1.2%
RL-OT04 / RL Directed Support	25,595	24,641	16,400	-8,241	-33.4%
RL-RG01 / TWRS Regulatory Unit	4,090	5,039	5,663	624	12.4%
RL-ST01 / PNNL Waste Management	14,851	15,020	13,961	-1,059	-7.1%
RL-TP02 / WESF Sub-Project	13,263	10,900	14,700	3,800	34.9%
RL-TP13 / Landlord Project	13,123	12,599	14,000	1,401	11.1%
RL-TW01 / Tank Waste Characterization	40,987	36,800	26,097	-10,703	-29.1%
RL-TW02 / Tank Safety Issue Resolution Project	28,636	19,900	26,691	6,791	34.1%
RL-TW03 / Tank Farms Operations	112,527	120,823	151,972	31,149	25.8%
RL-TW04 / Retrieval Project	56,917	64,414	55,113	-9,301	-14.4%
RL-TW05 / Process Waste Support	18,158	2,168	10,241	8,073	372.4%
RL-TW08 / Process Waste Privatization Infrastructure	0	18,400	18,914	514	2.8%
RL-TW09 / Immobilized Tank Waste Storage and Disposal Project	10,776	9,200	7,652	-1,548	-16.8%
RL-TW10 / TWRS Management Support	38,087	34,217	38,320	4,103	12.0%
RL-VZ01 / Sitewide Groundwater/Vadose Zone Project	0	6,700	11,325	4,625	69.0%
RL-WM03 / Solid Waste Storage and Disposal	31,551	34,851	36,919	2,068	5.9%
RL-WM04 / Solid Waste Treatment	30,134	22,089	25,359	3,270	14.8%
RL-WM05 / Liquid Effluents Project	30,378	29,359	30,988	1,629	5.5%
RL-WM06 / Analytical Services	28,518	26,801	26,734	-67	-0.3%
Total, Richland	647,198	665,992	687,397	21,405	3.2%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Hanford	602,662	620,501	651,373	30,872	5.0%
Richland Operations Office	44,536	45,491	36,024	-9,467	-20.8%
Total, Richland	647,198	665,992	687,397	21,405	3.2%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	276.0	46.0	417.0
Cleanups	9.0	32.0	16.0
Facilities Deactivation			
Deactivated During Period	3.0	50.0	20.0
Post Deactivation Monitoring	38.0	40.0	39.0
Deactivated - Not Yet	10.0	400.0	375.0
Facilities Decommissioning			
Cleanups	46.0	38.0	23.0
Transuranic Waste			
Storage (m^3)	16,300.0	16,300.00	16,400.00
Treatment	0.0	182.0	390.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	0.0	22.0	131.0
Mixed Low-Level Waste			
Storage (m^3)	9,171.0	10,000.0	8,815.0
Treatment (m^3)	22.0	606.0	500.0
DOE On-site/Commercial (m^3)	0.0	0.0	2,525.0
Low-Level Waste			
Storage (m^3)	180.0	180.0	180.0
Treatment (m^3)	12.0	0.0	0.0
Disposal - DOE On-site/Commercial (m^3)	5,920.0	6,120.0	3,880.0
High-Level Waste			
Storage (m^3)	204,000.0	207,000.0	221,000.0
Hazardous Waste			
Disposal - DOE On-site/Commercial (MT)	186.0	32.7	27.4

Site Description

Richland Operations Office -- Hanford Site

The United States Department of Energy's Richland Operations Office manages the Department's Hanford Site, in Southeastern Washington State The 1,465 square kilometer (560 square mile) site is bounded on the north by over 50 miles of the Columbia River, and to the south by Rattlesnake Ridge. The flat plateau containing the Hanford site is the only section of the mid-Columbia River that is not confined by gorges, and is known as the Hanford Reach The Department leases some of Hanford's land to the State of Washington which in turn leases it to the US Ecology and the Washington Public Power Supply System.

Hanford was established in secrecy during World War II to produce plutonium for the nation's nuclear weapons. Peak production years were reached in the 1960s when 9 production reactors were in operation along the river. The last to be decommissioned was N-Reactor and its fuel in the K-Basins is now being relocated to higher ground in the central plateau, known as the 200-Area. The 200-Area had been the site of major nuclear chemical processing plants which were all shut down by the early 1990s. The 200-Area is now the core of major waste management operations, and includes 177 underground storage tanks containing the high-level waste from past processing operations. A major effort to immobilize these wastes by vitrification is underway by a privatization contractor. The Plutonium Finishing Plant is one of the last production facilities that will remain operational -- to process remaining plutonium materials. Other areas of the site include the Fast Flux Test Facility (400-Area) which does not currently have a mission (currently budgeted and managed by the Office of Nuclear Energy); research and development activities by Pacific Northwest National Laboratories in the 300-Area; and support facilities in the 1100-Area, most of which have been turned over to the local communities.

The Hanford mission is now site cleanup and environmental restoration, including the groundwater/vadose zone integration project to protect the Columbia River. The cleanup is covered by a 1989 consent agreement between the Department of Energy, the Environmental Protection Agency, and the Washington State Department of Ecology. This Tri-Party Agreement contains enforceable milestones for bringing Hanford into compliance with the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act. Most of the Hanford budget is directed at compliance with these milestones. Additionally, the Defense Nuclear Facilities Safety Board takes great interest in safety at Hanford and has issued recommendations which are the basis for the Defense Nuclear Facilities Safety Board commitments that are also high priority budget items.

Office of River Protection

In order to more effectively manage the Tank Waste Remediation System, and in response to Section 3139 of the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999*, the Secretary of Energy established the Office of River Protection at the Hanford, Washington, site. The Manager of this Office will be a high level Departmental management official responsible for managing all aspects of the Tank Waste Remediation System, including the privatized contract for treatment and immobilization of tank waste, and the non-privatized operations, maintenance, engineering and construction activities in the tank farms. The Office of River Protection reports directly to the Assistant Secretary of Environmental Management and receives administrative support from the Manager, Richland Operations Office. The Department was further required by Congress to provide an "integrated management plan for all aspects of the Hanford tank farm operations including roles, responsibilities, and reporting relationships." This plan, entitled "The Office of River Protection Integrated Management Plan for the Hanford Tank Waste Remediation System" has been delivered to the Senate Committee on Armed Services and the House Committees on Commerce and on National Security. The plan describes the Tank Waste Remediation System project and provides details of the roles and responsibilities of key Department officials in executing this project. The Manager of the Office of River Protection will maintain an effective, highly skilled staff to manage the complex Tank Waste Remediation System activities and ensure proper integration of the non-privatized work scope with the needs of the privatization contract to lead to successful immobilization of high-level wastes and the ultimate protection of the Columbia River resources.

Detail Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Approximately 50 percent of the projects included in this section of the budget, and over 90 percent of the compliance costs, have had an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities based on estimated project progress and accumulated cost management success.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
HQNP-SI01-LT-RL/Security Investigations			
Funding will be used to perform new security investigations and re-investigations for non-Federal employees in accordance with DOE Order requirements for the Richland Site.			
■ Provide for contractor security investigations and re-investigations.			
HQNP-SI01-LT-RL	0	791	807
Metrics			
No quantifiable corporate performance measures are associated with this project.			
RL-ER01 / 100 Area Remedial Action			
This project's mission is to accomplish the remediation of over 400 past practice waste sites, in six separate reactor areas of the Hanford site to release the property for other beneficial use.			
■ Backfill 10 completed waste sites at 100 BC Source Area.			
■ Remediate 3 waste sites and dispose of 11,481 tons (5,288 m^3) of soil at 100 DR Source Area.			
■ Remediate 1 waste site and dispose of 124,572 tons (57,406 m^3) of soil at 100 FR Source Area.			
■ Remediate 10 waste sites and dispose of 132,845 tons (59,390 m^3) of soil at 100 HR Source Area.			
■ Dispose of other 100 Area Waste: 8,868 tons (4,085 m^3).			
■ Total waste sent to the on-site Environmental Restoration Disposal Facility is 277,800 tons (128,000 m^3).			
RL-ER01	12,074	22,054	26,111
Metrics			
Remedial Action/Release Site			
Assessments	269.0	46.0	0.0
Cleanups	7.0	29.0	14.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-ER02 / 200 Area Remedial Action			
This project's mission is to accomplish the remediation of over 700 past practice waste sites, located in the 200 East and 200 West Areas of the Hanford site.			
■ Field characterization activities are deferred until FY 2001.			
RL-ER02	1,279	1,967	0
Metrics			
Remedial Action/Release Sites			
Completed Assessments	7.0	0.0	0.0
Completed Cleanups	0.0	0.0	0.0
RL-ER03 / 300 Area Remedial Action			
This project's mission is to accomplish the remediation of over 100 past practice waste sites, just north of the city of Richland and adjacent to the Columbia River at the Hanford site to release the property for other beneficial (industrial) use.			
■ Continue closeout activities for 300-FF-1 source area, including two waste site completions. Send 24,600 tons (12,083 m^3) of waste to the Environmental Restoration Disposal Facility.			
■ Continue with feasibility studies and proposed plan for the 300-FF-2 source term.			
■ Complete 417 assessments in 300-FF-1 and 300-FF-2 Source Areas.			
RL-ER03	6,819	7,809	6,296
Metrics			
Remedial Action/Release Sites			
Completed Assessments	0.0	0.0	417.0
Completed Cleanups	2.0	3.0	2.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-ER04 / Environmental Restoration Disposal Facility			
This project's mission is to provide for the long-term Comprehensive Environmental Response, Compensation, and Liability Act waste disposal needs of the Hanford Environmental Restoration Program. The facility is located in between the 200 East and 200 West Areas.			
■ Complete interim closure construction for cells 1 and 2 of the disposal cell.			
■ Transport and dispose of over 314,400 tons (142,181 m^3) of low-level waste, some of which comes from decontamination and decommissioning, and the bulk from the 100 and 300 Area cleanups.			
RL-ER04	21,383	29,952	16,030
Metrics No quantifiable corporate performance measures are associated with this project.			
RL-ER05 / Facility Surveillance and Maintenance			
This project's mission is to provide surveillance and maintenance of over 1,200 waste sites and 700 facilities assigned to the Environmental Restoration Project. The sites and facilities are located throughout the Hanford site.			
■ Continue surveillance and maintenance of surplus facilities and reactors.			
■ Continue stabilization and radiological surveys of waste sites and complete annual herbicide spraying.			
■ Continue nuclear facility and facility transition support.			
■ Continue Canyon Disposition initiative at minimal funding level.			
RL-ER05	10,742	13,844	12,278
Metrics No quantifiable corporate performance measures are associated with this project.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
RL-ER06 / Decontamination and Decommissioning			
This project's mission is to decontaminate and decommission inactive facilities and to provide for interim safe storage and final disposition of the surplus reactors.			
■ Continue decontamination and decommissioning of 233-S building.			
■ Continue Interim Safe Storage Activities for the 105-DR and 105-F reactors.			
■ Begin characterization efforts associated with 224B facility.			
RL-ER06	17,675	11,540	10,769

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

RL-ER07 / Post Closure Surveillance and Maintenance			
This project's mission is to provide long-term surveillance and maintenance of waste sites after the completion of remediation, and of facilities, after decontamination and decommissioning. Post remediation monitoring is required under the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act.			
■ Post remediation monitoring per the close out of the 1100 Area National Priority List site.			
■ The FY 1998 estimate reflects deobligation and transfer of FY 1998 Budget Authority to other activities. Project was funded using FY 1997 carryover.			
RL-ER07	-10	59	60

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-ER08 / Ground Water Management			
This project's mission is the remediation of ground water and the long-term protection of the ground water resources of the Hanford site.			
■ Identification and tracking of radiological and hazardous contaminants in the ground water of the entire Hanford site.			
■ Perform well monitoring and 100/200 area pump and treat and vapor extraction activities.			
■ Support continued sampling, analysis, interpretation, and reporting of ground water condition.			
RL-ER08	20,603	19,152	19,394
Metrics No quantifiable corporate performance measures are associated with this project.			
RL-ER10 / Program Management and Support			
This project's mission is to provide programmatic oversight for individual Environmental Restoration Project Areas by ensuring that requisite management systems, project infrastructure and regulatory framework are in place and maintained until project completion.			
■ Safety, quality assurance, regulatory compliance, data management systems, engineering, project controls, and public support for the Environmental Restoration project essential services.			
■ Comprehensive Environmental Response, Compensation, and Liability Act Grants, site-wide assessments, special studies.			
RL-ER10	31,302	32,923	32,837
Metrics No quantifiable corporate performance measures are associated with this project.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

RL-HM01 / HAMMER

This project's mission is to provide employees of the Department and its contractors with the prerequisite safety and health training required for working on site, as well as the hazardous materials and emergency response training necessary for site operations. Realistic, hands-on props boost student achievement and help to improve clean up efficiency. Training costs are reduced by using advanced training technologies and by training other, non-DOE, organizations.

- Provide 28,000 student days of safety and health training for site workers.
- Provide a variety of other training and information services, including: the Hanford Safety and Health Library, Learning Resource Center, distance learning technology, and computer-based training.
- Provide safety and health degree programs (i.e., industrial hygiene) through distance learning.
- Increase the use of hands-on props event simulation in training.
- Evaluate training class.

RL-HM01	4,883	5,800	5,900

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-OT01 / Mission Support

This project's mission is to: operate the fundamental technical and business systems required for keeping the site open and performing clean up work; integrate contractor efforts to eliminate counterproductive or under productive workscope; provide environmental surveillance, including air/surface/liquid effluent monitoring; perform environmental/ecological/cultural management; maintain regulatory and technical baselines; and monitor risks to public safety.

- Continue the site operations and support services described above.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Regulatory compliance work includes: produce 20 documents for the National Environmental Protection Agency and 10 documents for the Resource Conservation and Recovery Act; produce 35 notices of construction; implement the Radiation and Protection of the Public and the Environmental Law (10 CFR 834); maintain and operate a steel head salmon management plan (Endangered Species Act); document historic site buildings (National Historic Preservation Act); and conducting other regulatory compliance work at the site level.			
■ Business and national program work includes operating and maintaining: an accelerated cleanup plan; integrated priority lists; multi-year work plans; project baseline summaries; and an Integrated Planning, Accountability and Budget reporting/management System.			
RL-OT01	22,857	26,180	25,866

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-OT04 / Richland Directed Support

This project's mission is to provide support for contract closure activities, stakeholder activities, and public entitlement and assistance programs.

- Review 240,000 pages of documents for declassification.
- Continue support for: downwinder litigation, air emissions monitoring, Resource Conservation and Recovery Act mixed waste fee, State of Washington and State of Oregon oversight, emergency preparedness grants, and Hanford Advisory Board and miscellaneous grants and activities.

RL-OT04	25,595	24,641	16,400

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

RL-RG01 / TWRS Regulatory Unit

This project funds the Richland Regulatory Unit that regulates the Tank Waste Regulatory System Privatization Contractor in the areas of nuclear, radiological, and process safety. The Regulatory Unit develops regulatory guidance, and reviews and approves contractor submittals to assure the contractor achieves adequate safety. This project will end if the Nuclear Regulatory Commission assumes regulatory authority. This is not expected to occur before FY 2006.

- Continue review of safety baseline documentation to enable the vendor (BNFL, Inc.) to proceed into the next stage of design.
- Issue needed regulatory guidance.
- Continue oversight and inspection in support of preconstruction activities.

RL-RG01	4,090	5,039	5,663

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-ST01 / PNNL Waste Management

This project provides the Pacific Northwest National Laboratory with waste management services and compliant operations in support of science and technology development for the multi-program needs.

- Maintain minimum safe conditions and compliant operations of the Pacific Northwest National Laboratory facilities; create operational drawings for the 325 Building gas, vacuum, and fire sprinkler piping.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Manage the consolidation, packaging, and transportation of currently generated Pacific Northwest National Laboratory wastes (283 m^3 of low-level waste; 34 m^3 of mixed low-level waste; 7 m^3 of transuranic waste; and 50 metric tons of hazardous wastes) for treatment and/or disposal; operate the permitted hazardous waste storage unit, the 90-day storage area, and the new 3,000 gallon Radioactive Liquid Waste Tank; verify compliance of Laboratory facility effluents.			
RL-ST01	14,851	15,020	13,961

Metrics

No quantifiable corporate performance measures are associated with this project.

RL-TP02 / WESF Sub-Project

Provides for safe, compliant, and cost effective storage of about 150,000,000 curies of encapsulated radioactive cesium and strontium until it can be treated in the FY 2013 - FY 2017 time period.

- Provide minimum surveillance and maintenance to maintain the facility safety basis.
- Initiate the Waste Encapsulation and Storage Facility Safety Analysis Report.
- Provide new method for non-destructive testing the integrity of 1,900 cesium and strontium capsules in order to identify problem capsules before they fail.
- Improve leak detection system in capsule storage pool to allow quicker isolation of a capsule in the event a capsule leak occurred.

RL-TP02	13,263	10,900	14,700

Metrics

This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

RL-TP13 / Landlord Project

This project's mission is to maintain, upgrade, replace, construct, purchase, perform surveillance on, deactivate and dispose of general purpose infrastructure and capital equipment throughout the Hanford site to support cleanup.

- Continue the support services described above at the minimum levels necessary to maintain safe site operation, which include:
  - Complete 200-West Area Fire Station Renovation;
  - Shutdown abandoned septic systems in the outer areas and at 20 buildings;
  - Dispose of three contaminated rail cars;
  - Mitigate chlorine contamination in the 200 Area infrastructure;
  - Replace 621A Building generator;
  - Refurbish two building exteriors and provide surveillance and maintenance for 375 vacant buildings;
  - Monitor 39 deactivated buildings; and
  - Maintain 60 miles of core site roads to avoid replacement.
- Replace two electric utility trucks with manlifts, and replace an ambulance and aerial-ladder fire engine.

RL-TP13	13,123	12,599	14,000

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Deactivation			
Buildings Deactivated During Period	3.0	50.0	20.0
Buildings Not Yet Deactivated	10.0	400.0	375.0
Buildings in Post-Deactivation Monitoring	38.0	40.0	39.0
Facility Decommissioning			
Cleanup	46.0	38.0	23.0

RL-TW01 / Tank Waste Characterization

This project's mission is to provide characterization for tank waste safe storage, operations, and retrieval/disposal. Includes analysis and improvements of sampling equipment and methods, and also supports Technology Development needs.

- Complete all Tank Characterization Reports required by the annually negotiated Waste Information Requirements Document under Tri-Party Agreement-M-44 and revised reports.
- Provide sample material to BNFL.
- Provide data management and interpretation support to the Tank Waste Remediation System program.

RL-TW01	40,987	36,800	26,097

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-TW02 / Tank Safety Issue Resolution Project

This project's mission is to provide an adequate safety basis for the management and storage of waste by the Tank Waste Remediation System; to develop and maintain an integrated authorization basis, and to resolve existing safety issues and associated Unreviewed Safety Questions.

- Develop operational safety Authorization Basis amendments and work toward closure for the waste level rise Unreviewed Safety Question in Tank 101-SY. Complete the final waste transfer and dilution, which began in FY 1999. Begin second waste transfer and dilution campaign as required.

54-291 99 - 67

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete the annual Authorization Basis update and upgrade for facilities ancillary to the tank farms. Maintain the Unreviewed Safety Question process and manage the licensing process.			
■ Continue with technical work required to resolve the flammable gas safety issue.			
RL-TW02	28,636	19,900	26,691

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-TW03 / Tank Farms Operations

This project's mission is to operate, maintain, and upgrade tank farm facilities to safely receive and store waste until it is retrieved; operate the single-shell tank interim stabilization program.

- Maintain waste within the single-shell tank system, including storage and transfer of waste.
- Maintain waste within the double-shell tank system.
- Perform interim stabilization of single-shell tanks. This project includes $35,110,000 for interim stabilization to support activities to be performed under the Consent Decree.
- Continues funding and construction of the Tank Farm Restoration and Safe Operations construction line-item (97-D-402). Included in the funding totals are $13,961,000 in FY 1998, $22,723,000 in FY 1999, and $20,516,000 in FY 2000 for the line-item.

RL-TW03	112,527	120,823	151,972

Metrics			
High-Level Waste Stored	204,000.0	207,000.0	221,000.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-TW04 / Retrieval Project			
This project's mission is to retrieve wastes from the single-shell and double-shell tanks and designated miscellaneous underground storage tanks; provide the waste to privatization contractor for treatment, and close waste tanks in accordance with regulatory requirements. These tanks are essential to successfully meld the operations of the Tank Waste Remediation System and the privatization contract. Otherwise, the wastes can not be successfully transferred, treated, and immobilized.			
■ Start the production phase by completing startup activities and readiness-for-delivery of feed to the privatization contractor by FY 2002.			
■ Complete sluicing campaign and initiate Tank 106-C heel removal and continue vadose zone characterization that will provide sufficient data to begin the National Environmental Policy Act closure process.			
■ Perform hydraulic sluicing and heel removal technology demonstration;			
■ Perform retrieval using the Initial Single Shell Tank Retrieval System; and			
■ Develop mixer pump technology and install retrieval systems for the Double Shell Tank retrieval.			
■ Continues funding and construction of the Initial Tank Retrieval System construction line-item 94-D-407. Included in the funding totals are $10,100,000 for FY 1998, $32,860,000 for FY 1999, and $4,060,000 for FY 2000 for the line-item.			
RL-TW04	56,917	64,414	55,113

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RL-TW05 / Process Waste Support			
The Process Waste Support Project provides for pretreatment and immobilization of the waste in the Hanford Tank Farms.			
■ Integrate the operations of the Tank Waste Remediation System and the Privatization contractor to ensure the success of the mission of the Disposal Program and meet the Tri-Party Agreement milestones.			
■ Perform assessments of the privatization contractor to assure that the contract requirements are met, and that the privatization contractor's proposals provide the best value for the Department of Energy.			
RL-TW05	18,158	2,168	10,241
Metrics No quantifiable corporate performance measures are associated with this project.			
RL-TW08 / Process Waste Privatization Infrastructure			
This provides the required facilities, physical interfaces and systems to assure integration of the privatization contractor with Hanford, and also covers the cost of water and electricity used by the privatization vendor essential to meeting major Tri-Party Agreement milestones M-50 and M-51. Failure to develop the infrastructure may cause delay or failure of the privatization effort, and risk imposition of significant penalties by the State of Washington.			
■ Complete turnover of the site to privatization contractors.			
■ Finalize site development and installation of construction utilities.			
■ Finalize construction of production utilities.			
■ Continues funding and construction of the Privatization Phase I Infrastructure Support construction line-item (99-D-403). Included in the funding totals $14,800,000 in FY 1999, and $13,988,000 in FY 2000 for the line-item.			
RL-TW08	0	18,400	18,914

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
No quantifiable corporate performance measures are associated with this project.			

RL-TW09 / Immobilized Tank Waste Storage and Disposal Project

Provides safe storage and final near surface disposal at Hanford for immobilized low activity waste, interim storage for immobilized high-level waste, other high-level waste products, and provide for final disposition of Hanford cesium/strontium capsules.

- Initiate conceptual design, submit a Part B permit application, and issue a Preliminary Safety Analysis Report for the immobilized tank waste storage and disposal project.

RL-TW09	10,776	9,200	7,652
Metrics			
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			

RL-TW10 / TWRS Management Support

The Management Support Project provides program management services and oversight for the Tank Waste Remediation System.

- Primary activities include executive management and strategic planning, systems engineering, and administration of program services. These tasks are required for normal project planning and execution. Also includes funds for contractor incentive fee.

RL-TW10	38,087	34,217	38,320
Metrics			
No quantifiable corporate performance measures are associated with this project.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

RL-VZ01 / Groundwater/Vadose Zone Integration

The project mission is to integrate ongoing groundwater treatment projects and ongoing studies on the vadose zone across the Hanford Site, determine the cumulative impacts of all Hanford Site wastes on the region and its peoples, apply sound science and technology, and partner with regulators, stakeholders, and Tribal Nations.

- Development of Revision "0" of the (System Assessment Capability) tool to address impacts of all Hanford Site waste.
- Implementation of science and technology roadmap to support site assessment and remediation and system assessment capability development.
- Provides for expert panel peer review.
- Provides for public involvement and outreach
- Continues integration management of planning, execution, and reporting.

RL-VZ01	0	6,700	11,325

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-WM03 / Solid Waste Storage and Disposal

Provides centralized facilities for storage of radioactive low-level mixed and transuranic wastes and for disposal of solid radioactive low-level waste for on-site and off-site generators. Included are management operations, surveillance, monitoring and limited maintenance of facility building, burial grounds, and current waste inventories, and receipt of waste from on-site and off-site generators.

- Dispose of about 2,500 m^3 of mixed low-level waste.
- Dispose of about 3,800 m^3 of low-level waste
- Complete transition of the Transuranic Storage and Assay Facility and initiate transition of the Nonradioactive Dangerous Waste Storage Facility to Hanford's Facility Deactivation Program and the Landlord Program.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Provide for minimum safe and compliant condition for receipt and storage of low-level waste, mixed low-level waste, and transuranic waste. Provide for disposal of low-level waste, mixed low-level waste, and hazardous waste from on-site and off-site generators, and preparation of transuranic waste for shipment to the Waste Isolation Pilot Plant.			
■ Complete the development of a deep disposal trench in the Low-Level Burial Ground for sufficient low-level waste disposal capacity.			
■ Complete the development of the Solid Waste Environmental Impact Statement.			
RL-WM03	31,551	34,851	36,919

Metrics			
Transuranic Waste			
Storage (m^3)	16,300.0	16,300.0	16,400.0
Mixed Low-Level Waste			
Storage (m^3)	9,171.0	10,000.0	8,815.0
Disposal: On-site/Commercial (m^3)	0.0	0.0	2,525.0
Low-Level Waste			
Storage (m^3)	180.0	180.0	180.0
Disposal: On-site/Commercial (m^3)	5,920.0	6,120.0	3,880.0
Hazardous Waste			
Disposal Commercial Waste (MT)	186.0	32.7	27.4

RL-WM04 / Solid Waste Treatment

This project provides on-site and commercial mixed waste treatment, waste verification and repackaging, and decontamination services to customers throughout the Hanford site. The work is performed in existing facilities at Hanford including the Waste Receiving and Processing Facility and limited decontamination services at the T-Plant complex.

- Continue preparation of disposal ready transuranic waste for future shipments to the Waste Isolation Pilot Plant.
- Fund Waste Receiving and Processing Facility transuranic and mixed low-level waste processing line operations.
- Complete and maintain the Waste Isolation Pilot Plant certification activities.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide for minimum safe condition and limited site-wide decontamination services.			
RL-WM04	30,134	22,089	25,359

Metrics			
Transuranic Waste			
Treatment (m^3)	0.0	182.0	390.0
Disposal Ready for Shipment to DOE Waste Disposal Site (m^3)	0.0	22.0	131.0
Mixed Low-Level Waste			
Treatment (m^3)	22.0	608.0	500.0
Low-Level Waste			
Treatment (m^3)	12.0	0.0	0.0

RL-WM05 / Liquid Effluents Project

Manages and integrates the current and future liquid effluent streams on the Hanford site through the timely storage, treatment, including volume reduction for the tank farms, and disposal.

- Reduce about 1,000,000 gallons of high-level waste tank volumes through the 242-A Evaporator.
- Provide site-wide liquid effluent services at five liquid effluent facilities.

RL-WM05	30,378	29,359	30,988

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-WM06 / Analytical Services

Provides for integrated waste and environmental sample analysis, process control support, field and sampling services, development services and expertise through on-site analytical laboratories or commercial services. Of significance is the analytical support to the Tank Waste Remediation System, spent nuclear fuel program, solid wastes, liquid effluent, and environmental restoration activities.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue to provide site-wide analytical services through three on-site laboratories and support commercial lab contracts.			
RL-WM06	28,518	26,801	26,734

Metrics
No quantifiable corporate performance measures are associated with this project.

Total, Richland	647,198	665,992	687,397

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQNP-SI01-LT-RL / Security Investigations	
■ No significant change	16
RL-ER01 / 100 Area Remedial Action	
■ This increase in funding is required to handle additional waste volume being excavated in the 100 Areas	4,057
RL-ER02 / 200 Area Remedial Action	
■ This decrease in funding in FY 2000 reflects postponement of all restoration activities in the 200 Area until FY 2001	-1,967
RL-ER03 / 300 Area Remedial Action	
■ This decrease in funding provides for completion of two release sites in FY 2000, following three release site completions in FY 1999. The Milestone M-16-03D is in the process of being re-negotiated	-1,513
RL-ER04 / Environmental Restoration	
■ This decrease in funding is linked to completion of a major facility expansion in FY 1999. No facility expansion will be conducted in FY 2000; transportation and disposal activities continue in FY 2000	-13,922

	FY 2000 vs. FY 1999 ($000)
RL-ER05 / Facility Surveillance and Maintenance	
■ The slight decrease in funding reflects a combination of completion of backlogged corrective maintenance activities on surplus facilities (100-N Area), less waste sites where surveillance and maintenance is needed (due to completions) and efficiencies realized through remote monitoring.	-1,566
RL-ER06 / Decontamination and Decommissioning	
■ No significant change.	-771
RL-ER07 / Long-Term Surveillance and Maintenance	
■ No significant change.	1
RL-ER08 / Ground Water Management	
■ No significant change.	242
RL-ER10 / Program Management and Support	
■ No significant change.	-86
RL-HM01 / HAMMER	
■ Cost increase represents minimum allowance for growth in health and safety training.	100
RL-OT01 / Mission Support	
■ No significant change.	-314
RL-OT04 / Richland Directed Support	
■ Cost decrease is due to the scheduled closeout of the Westinghouse Hanford contract; the completed implementation of the Hanford Health Information Network; and complete settlements for payments-in-lieu-of-taxes and suspension of current payments.	-8,241
RL-RG01 / TWRS Regulatory Unit	
■ Small increase is needed for review of additional BNFL, Inc. deliverables. This project is mandatory because the Tank Waste Remediation System privatization contractor cannot proceed if the regulatory unit does not carry out its nuclear safety regulatory responsibilities.	624

	FY 2000 vs. FY 1999 ($000)
RL-ST01 / PNNL Waste Management	
■ Decrease reduces legacy waste and contamination management efforts at the Pacific Northwest National Laboratory facilities.	-1,059
RL-TP02 / WESF Sub-Project	
■ Increase allows for cesium/strontium capsule storage and leak detection system upgrades; as well as facility safety analysis report revision.	3,800
RL-TP13 / Landlord Project	
■ Cost increase is due to utility and emergency vehicle replacements, automation upgrades, and road refurbishment.	1,401
RL-TW01 / Tank Waste Characterization	
■ The decrease assumes the Defense Nuclear Facilities Safety Board Recommendation 93-5 will be closed before FY 2000, in which case the need to sample tanks for safety-related reasons significantly decreases. The Tri-Party Agreement milestones for characterization should not be affected. However, the reduced budget may not support characterization infrastructure to respond to emerging needs.	-10,703
RL-TW02 / Tank Safety Issue Resolution Project	
■ The increase is to maintain integrated authorization basis for the management and storage of waste by the Office of River Protection, and will fund a second transfer of waste from SY-101, as required.	6,791
RL-TW03 / Tank Farms Operations	
■ The funding fully supports activities within the planned baseline scope, with a major increase related to the stabilization of high-level waste tanks as a result of the Consent Decree	37,940
RL-TW04 / Retrieval Project	
■ The decrease is because construction for the Initial Tank Retrieval System (94-D-407) is being delayed to meet the new privatization schedule. It will still provide timely feed delivery to the BNFL, Inc. to support the 90 percent confidence level schedule.	-9,301

	FY 2000 vs. FY 1999 ($000)
RL-TW05 / Process Waste Support	
■ The increase is needed because the privatization contractor will be moving from design into the construction phase, which requires more DOE support.	8,073
RL-TW08 / Process Waste Privatization Infrastructure	
■ No significant change.	514
RL-TW09 / Immobilized Tank Waste Storage and Disposal Project	
■ Decrease is due to slow-down of design efforts because the BNFL, Inc. schedule allows delay in availability of storage facilities.	-1,548
RL-TW10 / TWRS Management Support	
■ Increase related to systems engineering efforts aimed at resolving numerous issues in the tank farms, such as single shell tank pumping in response to the Consent Decree.	4,103
RL-VZ01 / Groundwater/Vadose Zone Integration	
■ The increase in funding is to support the continued development of the system assessment capability, which will assess the impacts of all Hanford Site wastes and the implementation of the applied science aspects of the science and technology roadmap with specific emphasis on the vadose zone and inventory technical elements.	4,625
RL-WM03 / Solid Waste Storage and Disposal	
■ Increase is due to the preparation of disposal ready transuranic wastes for shipment to the Waste Isolation Pilot Plant.	2,068

	FY 2000 vs. FY 1999 ($000)
RL-WM04 / Solid Waste Treatment	
■ Increase for the Waste Receiving and Processing Plant treatment of transuranic waste for the Waste Isolation Pilot Plant	3,270
RL-WM-05 / Liquid Effluents Project	
■ Increase provides for a 242-A evaporator campaign, which is used to reduce high-level waste tank volumes	1,629
RL-WM06 / Analytical Services	
■ No significant change	-67
Total Funding Change, Richland	28,196

Savannah River

Mission Supporting Goals and Objectives

Mission

The Savannah River Site is a key United States Department of Energy facility in accomplishing the mission of the Defense Environmental Management, Post 2006 Completion account.

The Savannah River Cleanup Program has as its mission the treatment and disposal of the legacy materials and wastes that resulted from the production of nuclear materials during the Cold War. This legacy includes contaminated facilities and land areas, many of which still contain nuclear materials and wastes. The Savannah River Site, located near Aiken, South Carolina, covers over 300 square miles and includes five nuclear reactors, two chemical separations facilities, fuel and target fabrication facilities, tritium processing facilities, a heavy water facility, two high-level waste tank farms, low-level waste storage and disposal facilities, a high-level waste treatment facility, the Savannah River Technology Center, and numerous administrative and technical support facilities. Additionally these facilities have varying degrees of environmental contamination (soil and groundwater); the majority of which will require some remedial action to address environmental and health risks.

The Savannah River Cleanup Program is composed of the following major elements: spent nuclear fuel management, nuclear materials stabilization, waste management (high-level, transuranic, hazardous, mixed low-level, and other), deactivation, remediation, and supporting landlord requirements. This account funds all activities whose life-cycle will be completed after FY 2006.

Program Goal

The Savannah River Site is committed to managing the spent nuclear fuel, stabilizing nuclear materials, and managing all types of wastes using currently available (or near-term) technology and facilities. Eventually, the nuclear materials would be dispositioned and the remaining spent nuclear fuel and wastes would be sent to geologic repositories. To the extent possible (to be determined through technical analyses, National Environmental Policy Act review, and the regulatory process) Savannah River may be able to assist other sites in elimination of their Cold War "legacies". The Savannah River Site intends to complete stabilization of all on hand spent nuclear fuel requiring stabilization and all nuclear materials in FY 2006. Foreign Research Reactor spent nuclear fuel will continue to be accepted until FY 2009 and Domestic Research Reactor spent fuel will continue to be received at the Savannah River Site well beyond this date. This spent nuclear fuel will be prepared and stored in a form that can be shipped to a geologic repository beginning approximately 2015. Approximately seventeen hundred canisters of high-level waste, representing 33 percent of inventoried high-level waste, will be vitrified by FY 2006. Some of the major inactive processing facilities will be deactivated by FY 2006 and most high-risk release sites will be remediated by that time.

Due to the variety and amounts of nuclear materials and wastes on-site, the extent of facility and land contamination, and its potential to help solve cleanup issues at other "legacy" sites in the Department of Energy complex, the Savannah River Site will have a "long-term" cleanup mission extending beyond FY 2006. After FY 2006, the focus will be on receiving a small amount of foreign research reactor fuel and a continuing quantity of domestic research reactor spent nuclear fuel; managing the high-level, transuranic, hazardous, mixed low-level, and other wastes through about FY 2035; deactivating facilities as missions are completed and the facilities become excess; and remediating the remaining low risk sites.

Program Objectives

In FY 2000, 67 casks of spent nuclear fuel are expected to be received from foreign and domestic sources and the fuel (i.e., not the casks) safely stored in Savannah River's basins. One-hundred canisters of high-level waste will be produced at the Defense Waste Processing Facility and 348 m^3 of high-level waste will be treated. The Consolidated Incinerator Facility will continue to operate and will treat mixed low-level waste, and hazardous waste. Approximately 70,000 m^3 of other waste will be treated at the Effluent Treatment Facility and disposed of on-site.. No facilities will be deactivated in order to avail funding for higher priority activities, although 15 release sites (about 3 percent of the release sites) will be remediated in FY 2000.

The goal of the Spent Nuclear Fuel program is to support the U.S. nonproliferation policy through implementing the Foreign Research Reactor Spent Fuel Acceptance program and to manage the spent nuclear fuel currently at the site (foreign and domestic research reactor spent nuclear fuel, as well as the Savannah River Site production reactor spent nuclear fuel) by stabilizing the fuel or preparing it for long-term disposition in a Federal repository. Some of the spent nuclear fuel currently on-site (aluminum based or declad spent nuclear fuel in a degraded condition) is considered to be "at-risk" and is scheduled to be shipped to the canyon facilities for processing. Potentially difficult to dispose of spent nuclear fuel is currently being evaluated for processing in the canyons in preparation for eventual disposition. Savannah River plans to prepare other intact fuel for ultimate disposal in a geologic repository through a program in which the intact fuel is treated by one of two alternative candidate technologies (direct co-disposal or dilution by melting followed by co-disposal). To support this approach, the Savannah River Site has included in this budget request a design only line-item project to design a transfer and storage facility to receive, treat, and/or package spent nuclear fuel in canisters and safely dry-store this spent nuclear fuel in a "road-ready" form until a geologic repository is available. In addition to providing needed storage capacity, this facility will also permit an accelerated closure of the Receiving Basin for Offsite Fuel, which is being used for wet storage on an interim basis.

The Savannah River Site waste management activities encompass all types of waste generated and stored at the Savannah River Site. The High-Level Waste program integrates management of existing and new facilities to volume reduce, treat, and vitrify high-level waste for final disposal and to empty storage tanks so they can be closed. Savannah River has an estimated 125,398 m^3 (approximately 34,000,000 gallons) of high-level waste in the form of liquid, sludge and salt cake. This volume represents about 480,000,000 curies of radioactivity and is stored in 49 active tanks in two "tank farms" and related high-level waste facilities. Included are operation of the high-level waste evaporators to provide space in the tank farms to handle waste generated by the stabilization of nuclear materials, the continued safe storage of existing and newly generated high-level waste, the operation of the Defense Waste Processing Facility to vitrify high-level waste, the operation of Extended Sludge Processing to provide sludge feed for the Defense Waste Processing Facility, and operation of the Glass Waste Storage Building to store "road ready" vitrified high-level waste. The operation of the Saltstone Facility has been curtailed until an alternative for salt processing is implemented. The In-Tank Precipitation and Late Wash facilities were expected to pretreat the salt portion of the high-level waste. Due to technical issues concerning the generation of larger than anticipated amounts of benzene, all activities for pre-treatment of the salt feed have been suspended A salt processing systems engineering evaluation is in progress. All known salt processing options will be evaluated against the high-level waste system requirements and the best option will be selected in FY 2000. In order to support this activity, a supplemental Environmental Impact Statement will be prepared to assist in the decision making process.

Savannah River also manages varying amounts of other waste types. Efforts to reduce the legacy volume of waste at the site will be curtailed in the low-level waste and hazardous waste areas Major activities in solid waste management include: continued off-site shipment of hazardous waste and polychlorinated biphenyl waste, identified in the Site Treatment Plan, initial shipments of transuranic waste to the Waste Isolation Pilot Plant, continued operation of the Effluent Treatment Facility, and continued sanitary waste operations.

The Savannah River Site has identified over 300 currently inactive legacy facilities in a position to be deactivated. Facility assessments are being undertaken to provide condition / hazard characterization, and to establish documented surveillance and maintenance plans. However, full development and implementation of facility disposition plans have been deferred for these facilities in order to avail funding for higher priority activities. This budget does not include any significant activity related to facility deactivation.

The environmental restoration activities encompass all aspects of assessment, and remediation of facilities and release sites (including associated ground water) that are no longer a part of active operations at the Savannah River Site. There are currently 477 release sites at Savannah River. These release sites are grouped into six watershed areas: Flood Plain Swamp, Fourmile Branch, Lower Three Runs, Pen Branch, Steel Creek, and Upper Three Runs. Primary on-site contaminants include various nuclides (including plutonium, tritium, and uranium), volatile organic compounds, heavy metals, and solvents. Restoration activities are conducted at the Savannah River Site pursuant to the Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, the site Federal Facilities Agreement (August 1993), several settlement agreements, and a consent decree. Through FY 1998, 175 release sites were completed. In FY 1999, 12 release sites are forecast for completion, and this FY 2000 budget will result in completion of an additional 6 release sites. The Savannah River Site's objective for environmental restoration remediation activities is to have most high-risk release sites in remediation by FY 2006.

Landlord activities are directed toward the management of general purpose infrastructure and site-wide program support that are essential for accomplishing essential missions at the Savannah River Site and maintaining the viability of the site for potential new missions in areas such as non-proliferation. Specific examples of infrastructure and support systems include: grounds, roads, general purpose buildings, utilities, communications, computers and information management, fleet management, maintenance and fabrication, emergency services, safeguards and security, land management, analytical laboratories, and environmental test facilities. Other examples include grants to two states for emergency management purposes to three counties and for payment-in-lieu-of-taxes; and to several universities for research in support of Site missions. It also includes interagency agreements, plus a cooperative agreement with the University of Georgia for managing the Site ecology laboratory

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as, at a project level in the Detailed Program Justification

Significant Accomplishments and Program Shifts

- Achieved space gain of 2,500,000 gallons (FY 1998) and 2,900,000 gallons (FY 1999) in tank farm through evaporation.
- Closed the second high-level waste tank (FY 1998).
- Produced 250 canisters (FY 1998) and 200 canisters (FY 1999) of vitrified high-level waste at the Defense Waste Processing Facility.
- Disposed of approximately 800 low-level waste drums, which were formerly managed as transuranic waste (FY 1998).

- Performed equipment upgrades, training and procedure development, and startup activities necessary to support the shipment of transuranic waste to the Waste Isolation Pilot Plant (FY 1998/FY 1999).
- Operation of the Consolidated Incinerator Facility to treat mixed low-level waste and low-level waste (FY 1998/FY 1999).
- Commence operation of the Replacement High-Level Waste Evaporator (FY 1999).
- Pursue alternate technologies for salt processing (FY 1999).
- Completion of 63 release site assessments (FY 1998) and 27 release site assessments (FY 1999).
- Completion of 60 release site remediations (FY 1998) and 12 release site remediations (FY 1999).
- Remediation of 360,000,000 gallons of ground water thru FY 1999, and removal of 115,000 lbs. of volatile organic compound (FY 1999).
- Executed the 320-M Laboratory deactivation plan - written and approved in FY 1997.
- Resumed operation of the M-Area Vitrification Facility shutdown in FY 1997 for melter replacement (FY 1998).
- Deactivation planning for the 320-M Target Fabrication Facility, the 313-M Target Slug Fabrication Facility, 322-M Metallurgical Laboratory, and the 321-M Fuel Fabrication Facility (FY 1998).
- Complete vitrification of all M-Area waste tank sludge (FY 1999).
- Complete deactivation of the Liquid Effluent Treatment Facility (FY 1999).
- Receive 35 casks of foreign research reactor spent nuclear fuel and 37 casks of domestic research reactor spent nuclear fuel (FY 1999)
- Demolition of the P and C powerhouses (FY 1998).
- Completed R-Reactor disassembly basin precharacterization sampling (FY 1998).
- Began operation of the C-Area Decon Facility (FY 1998).
- Initiated development of facility documentation and a surveillance and maintenance plan for P-Area (FY 1999).
- Deactivation of the R-Reactor disassembly basin (FY 1999).
- Vitrify an additional 100 canisters of high-level waste and evaporate 3.8 million gallons of high-level waste to provide additional tank space (FY 2000).
- Prepare 3 shipments of disposal-ready transuranic waste for shipment to the Waste Isolation Pilot Plant (FY 2000).
- Complete 6 release sites and complete assessments for 25 others (FY 2000).
- Receive 29 casks of Foreign Research Reactor Spent Nuclear Fuel (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-LT-SR / Security Investigations	0	1,804	1,800	-4	-0.2%
SR-DO02 / WSI Landlord Project	52,600	54,375	54,475	100	0.2%
SR-DO03 / Savannah River Natural Resource Management and Research Institute	7,800	6,379	7,038	659	10.3%
SR-DO04 / Ecology Lab Project	8,600	7,896	8,084	188	2.4%
SR-DO05 / DOE External Program Support	5,718	6,155	6,150	-5	-0.1%
SR-DO07 / DOE Program Support	5,999	10,923	7,208	-3,715	-34.0%
SR-ER01 / Flood Plain Swamp Project	5,543	8,482	6,112	-2,370	-27.9%
SR-ER02 / Four Mile Branch Project	28,372	25,140	35,379	10,239	40.7%
SR-ER03 / Lower Three Runs and Operations Project	4,385	20,137	26,603	6,466	32.1%
SR-ER04 / Pen Branch Project	10,043	6,866	8,984	2,118	30.8%
SR-ER05 / Steel Creek Project	2,431	7,451	3,316	-4,135	-55.5%
SR-ER06 / Upper Three Runs Project	22,091	20,115	15,879	-4,236	-21.1%
SR-ER07 / Program Management	23,845	11,500	13,470	1,970	17.1%
SR-FA02 / F-Canyon Deactivation Project	0	522	537	15	2.9%
SR-FA16 / F-Area Monitoring	1,545	738	444	-294	-39.8%
SR-FA17 / H-Area Monitoring and Minor Facility Monitoring	0	2,764	4,713	1,949	70.5%
SR-FA18 / M-Area Monitoring Project	23,692	11,103	8,087	-3,016	-27.2%
SR-FA19 / D-Area Monitoring Project	0	0	1,261	1,261	>999.9%
SR-FA20 / Reactors Monitoring Project	8,582	10,081	13,566	3,485	34.6%
SR-HL01 / H-Tank Farm	85,756	91,516	87,851	-3,665	-4.0%
SR-HL02 / F-Tank Farm	51,347	57,479	60,737	3,258	5.7%
SR-HL03 / Waste Removal Operations and Tank Closure	1,603	3,099	1,943	-1,156	-37.3%
SR-HL04 / ITP/ESP/LW Operations	75,233	48,374	58,446	10,072	20.8%
SR-HL05 / Vitrification	126,864	131,959	126,614	-5,345	-4.1%
SR-HL06 / Glass Waste Storage	324	599	368	-231	-38.6%
SR-HL07 / Effluent Treatment Facility	17,900	16,539	17,580	1,041	6.3%
SR-HL08 / Saltstone	8,096	1,102	1,222	120	10.9%
SR-HL12 / High-Level Waste Removal	23,923	22,874	14,433	-8,441	-36.9%
SR-HL13 / Salt Disposition	0	12,983	42,129	29,146	224.5%
SR-IN11 / Infrastructure Line-Item	0	1,274	200	-1,074	-84.3%
SR-IN12 / Operating Projects	10,207	18,246	32,693	14,447	79.2%
SR-SF01-LT / K-Reactor Spent Nuclear Fuel Project (Post 2006)	0	0	33,410	33,410	>999 9%
SR-SF02 / L-Reactor Spent Nuclear Fuel Project	20,108	31,826	36,187	4,361	13.7%

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
SR-SF03 / RBOF Spent Nuclear Fuel Project	19,155	18,206	11,773	-6,433	-35.3%
SR-SF04-LT / Heavy Water - D-Area (Post 2006)	0	0	4,984	4,984	>999.9%
SR-SF09 / Spent Nuclear Fuel Treatment and Storage	950	1,455	11,500	10,045	690.4%
SR-SW01 / Consolidated Incinerator Facility	24,873	23,255	26,045	2,790	12.0%
SR-SW02 / Transuranic Waste Project	9,220	13,991	10,602	-3,389	-24.2%
SR-SW03 / Mixed Low-Level Waste Project	2,854	4,994	5,845	851	17.0%
SR-SW04 / Low-Level Waste Project	8,602	12,150	9,947	-2,203	-18.1%
SR-SW05 / Hazardous Waste Project	5,468	4,901	3,971	-930	-19.0%
SR-SW06 / Sanitary Waste Project	1,747	2,068	2,156	88	4.3%
SR-SW07 / Pollution Prevention	4,679	1,710	1,122	-588	-34.4%
Total, Savannah River	710,155	733,031	824,864	91,833	12.5%

Funding By Site

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Savannah River Site	682,038	699,874	794,584	94,710	13.5%
Savannah River Operations Office	28,117	33,157	30,280	-2,877	-8.7%
Total, Savannah River	710,155	733,031	824,864	91,833	12.5%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	63.0	28.0	25.0
Cleanups	60.0	13.0	6.0
Transuranic Waste			
Storage (m^3)	10,837.0	11,527.0	11,616.0
Ship to DOE Disposal Site (m^3)	0.0	44.0	35.0
Mixed Low-Level Waste			
Storage (m^3)	2,121.0	2,276.0	1,160.0
Treatment (m^3)	3,183.0	1,073.0	795.0
On-site/Commercial (m^3)	0.0	0.0	50.0
Low-Level Waste			
Treatment (m^3)	7,400.0	11,417.0	3,795.0
On-site/Commercial Dispsal (m^3)	4,423.0	9,576.0	3,235.0
Storage (m^3)	18,040.0	14,854.0	14,525.0
Hazardous Waste			
On-site/Commercial Disposal (MT)	482.0	816.0	523.0
Spent Nuclear Fuel			
Stable, Not Disposition-Ready (m^3)	28.2	40.6	47.7
Stable, Not Disposition-Ready (MTHM)	21.9	23.5	24.3
In Stabilization Process (m^3)	52.2	52.1	59.6
In Stabilization Process (MTHM)	21.7	21.7	22.6
Made Disposition During the Period (m^3)	0.0	0.1	0.0
High-Level Waste			
Storage (m^3)	128,513.0	126,501.0	125,917.0
Treatment (m^3)	871.0	696.0	348.0
Canisters Produced	250.0	200.0	100.0

Site Description

Savannah River Site

The complex covers 198,344 acres, or 310 square miles encompassing parts of Aiken, Barnwell, and Allendale counties in South Carolina, bordering the Savannah River.

The site is owned by the Department of Energy and operated by an integrated team led by Westinghouse Savannah River Company. Under the contract that went into effect October 1, 1996, the Westinghouse Savannah River Company is responsible for the site's nuclear facility operations; Savannah River Technology Center; environment, safety, health, and quality assurance; and all of the site's administrative functions. The team also includes Bechtel Savannah River Inc. (parent company: Bechtel National Inc.), which is responsible for environmental restoration, project management, engineering and construction activities; Babcock and Wilcox Savannah River Company (parent Company: Babcock and Wilcox Government Group), which is responsible for facility decontamination and decommissioning; and the British Nuclear Fuel Limited Savannah River Corporation (parent company: British Nuclear Fuel Limited, Inc.), which is responsible for the Site's solid waste program. Wackenhut Services, Incorporated, is responsible for the Sites physical security program.

Due to past operations and disposal practices, the Savannah River Site was placed on the Comprehensive Environmental Response, Compensation, and Liability Act National Priorities List by the Environmental Protection Agency in 1989. In 1993, the Savannah River Site entered into a Federal Facility Agreement with the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control to ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and that appropriate corrective/remedial action is taken, as necessary, to protect the public health and welfare and the environment. In addition to the Federal Facility Agreement, the Savannah River Site has also entered into assessment/clean-up of several portions of the Site via Resource Conservation and Recovery Act permits as required by several settlement agreements.

Detailed Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

The Savannah River Site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure* plan. The funds requested for FY 2000 are appropriate to perform the activities based on the use of the "Activity-Based Costing Methodology" and on an independent review of the programmatic assumptions and projected scope. All construction line-item projects were validated and many projects received an independent cost estimate review.

HQNP-SI01-LT-SR / Security Investigations

Non-Federal security investigations will be performed in accordance with DOE Order requirements.

- Funding will be used to perform new security investigations and re-investigations for non-Federal employees for the Savannah River Site.

HQNP-SI01-LT-SR	0	1,804	1,800

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-DO02 / WSI Landlord Project

Wackenhut Services, Incorporated-Savannah River Site is the Management and Operating contractor for security services at the Savannah River Site. The Wackenhut Services, Incorporated-Savannah River Site provides, trains, and maintains a uniformed protective force for the physical protection of the Department of Energy security interests and other related duties. Responsibilities include protection against theft of Special Nuclear Material and government property, prevention of radiological, toxicological and industrial sabotage, and protection of site employees and the public. The contractor employs armed and unarmed security personnel, supervisors, management, and other administrative and support personnel to meet the varied requirements of the contract.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Increase of protective force staffing at 100-K in support of increased material protection requirements for plutonium storage.			
■ Continue to enforce security requirements for the site as outlined in the DOE Orders, the Site Safeguards and Security Plan and as specified in the Management and Operations contract.			
SR-DO02	52,600	54,375	54,475

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-DO03 / Savannah River Natural Resource Management and Research Institute

The Savannah River Natural Resource Management and Research Institute conducts a program of natural management and research to provide sustainable forest products within a National Environmental Research Park, enhance biological diversity, protect threatened, endangered, and sensitive species, and provide quality habitat for wildlife.

The Savannah River Institute manages the Savannah River Site secondary road system, maintains the exterior boundaries, participates in waste-site closure projects, and provides aerial photo services. Also, the Savannah River Institute provides a wildland fire program that ensures on-site initial attack capability as well as fire prevention, presuppression, and detection program. Smoke emissions are managed to reduce negative impacts to personnel and facilities. Planning, public affairs, health and safety, administration, and the Historically Black Colleges and Universities environmental field station, and a natural resources science, math, and engineering education program are integral components of the resource management activities of the Savannah River Institute.

- Manage forest and land resources on a 300 square mile site.
- Document endangered wildlife and plant life.
- Perform watershed stabilization and erosion control.
- Continue maintenance of secondary roads and bridges.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Perform biological evaluations.			
■ Perform prescribed burning.			
■ Perform research on flora and fauna.			
SR-DO03	7,800	6,379	7,038

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-DO04 / Ecology Lab Project

The Savannah River Ecology Laboratory is a research unit of the University of Georgia operating on the Savannah River Site for over forty years. The laboratory works closely with other contractors to provide an independent academic assessment of Site clean-up and continuing operations. The Savannah River Ecology Laboratory is conducting research, which will provide the Site operational personnel with information aimed at reducing the cost of clean-up and remediation while ensuring a biodiversity to the restored environment.

In addition, the Savannah River Ecology Laboratory has provided the Department of Energy with important data relating to the regulatory requirements for endangered plants and animals. The Savannah River Ecology Laboratory has a laboratory and field-research program recognized by scientists from all over the world. The laboratory has published over 2000 articles in peer reviewed journals and has more than 25 books authored by its scientific staff.

The facilities of the Savannah River Ecology Laboratory consist of unique research labs with specialty instruments to special outdoor facilities such as greenhouses, aviaries, experimental ponds, a rhizotron, animal care facility, and a specially equipped distance learning classroom. The laboratory has a program, which reaches out to our stakeholders in the area of the Savannah River Site, and provides classroom programs and information on the benefits of the Savannah River Site as a National Research Park.

■ Conduct studies in radioecology and ecological stewardship.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue active research in environmental chemistry/hydrogeochemistry; environmental computational chemistry; phytoremidation, ecological stewardship; ecotoxicology, remediation, and risk assessment; and radioecology.			
SR-DO04	8,600	7,896	8,084

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-DO05 / DOE External Program Support

Funding is provided to the South Carolina Department of Health and Environmental Control for oversight of the Savannah River Operations Office activities to be carried out under the Federal Facilities Agreement.

- The United States Army Corps of Engineers, the United States Forestry Service, and the United States Geological Survey will provide program support to the environmental restoration division.
- University research grants will be provided to support the environmental restoration program.
- Funding is provided under the Agreements-in-Principle for the South Carolina Department of Health and Environmental Control Emergency Preparedness/Planning, Emergency Monitoring and Oversight, and the Georgia Emergency Management Agency for oversight of emergency preparedness activities and non-regulatory environmental monitoring programs.
- The State of the South Carolina Department of Health and Environmental Control will provide oversight of cleanup activities performed under the Federal Facilities Agreement.

SR-DO05	5,718	6,155	6,150

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-DO07 / DOE Program Support

The overall purpose of this project is to enlist off-site resources to independently verify site characteristics in a global sense, and create a culture within surrounding communities, which enables the Savannah River Site continuation of environmental restoration and waste management missions, which need public trust and confidence.

Program support will be provided for payment-in-lieu-of-taxes, Historically Black Colleges and Universities, South Carolina Water Resources Commission, South Carolina Universities and Research and Education Foundation, interagency agreements, such as with the Office of Personnel and Management for investigations of the Spent Nuclear Fuel project and the Departmental initiatives.

This program also supports the operation and maintenance of a public reading room, which houses documents relative to the Savannah River Site, Defense Nuclear Facilities Safety Board and other Department of Energy sites to maintain stakeholder involvement. Funding is provided for consultants assisting the Department of Energy-Savannah River on labor law and other issues. Other activities include support for cooperative and interagency agreements providing long-term observation networks to monitor water level, flow paths, water quality, and to detect changes as ground water pumpage increases or decreases. Also, supports training and the stewardship program.

- Continuation of the National Environmental Training Organization funded by Savannah River.
- Monitor the flow of the Site's wastewater effluents and streams.
- Complete Environmental Impact Statements, as required.
- Support compliance with the Clean Water Act.
- Perform archaeological field reviews, and curation of artifacts in compliance with the Archaeological Resource Protection Act and Historic Preservation Act.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Make payment-in-lieu-of-taxes to the counties of Aiken, Allendale, and Barnwell.			
■ Limited support for the Historically Black Colleges and Universities and other grants.			
SR-DO07	5,999	10,923	7,208

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-ER01 / Flood Plain Swamp Project

The Flood Plain Swamp Watershed project is one of six geographical divisions of the Savannah River Site for the purpose of implementing the Federal Facility Agreement. The Flood Plain Swamp Watershed Project contains three primary areas: the D-Area, TNX Area, and the West M Area. Portions of the D Area were used from the mid-1950's through the mid-1980's for disposal of coal ash, oil, chemicals, and general debris. The TNX was also operated during the same time-frame for the purpose of conducting pilot tests to support the Savannah River Site activities and operations. Portions of the West M Area were used for disposal of waste before government control of the Site and for disposal of general debris after the Site started operations.

Remediation of the Flood Plain Swamp Watershed project will consist of the following:

- Preliminary evaluation of known suspect areas to determine if action is necessary;
- Investigation and analysis of the identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation;
- Implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, and
- Post-action monitoring to ensure that the implemented technology was effective.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ TNX-Area Groundwater subproject: Operate two Geo Siphon Cells and begin installation of additional cells and vapor extraction units.			
■ TNX-Area Old TNX Seepage Basin subproject: Begin remedial action at this basin.			
■ D-Area Oil Seepage Basin subproject: Complete remedial action at this basin.			
■ D-Area Waste Oil Facility subproject: Continue assessment work at this facility.			
■ Flood Plain Swamp Integrator Operable Unit subproject: Complete work plan preparation for this subproject and begin field start for monitoring.			
■ Savannah River Integrator Operable Unit subproject: Continue field monitoring at this subproject.			
SR-ER01	5,543	8,482	6,112

Metrics			
Remedial Action/Release Site			
Assessments	8.0	4.0	2.0
Cleanups	8.0	1.0	2.0

SR-ER02 / Four Mile Branch Project

The Four Mile Branch Watershed project is one of six geographical divisions of the Savannah River Site for the purpose of implementing the Federal Facility Agreement. The Four Mile Branch Watershed project contains sites in five area: the E-Area, C-Area, N-Area, F-Area, and the H-Area. The E-Area consists of several adjacent facilities that were former or are current disposal sites for hazardous and radioactive wastes and spent solvent generated from plant processes. The C-Area consists of several facilities that were former disposal sites for hazardous and/or radioactive wastes and spent solvents generated from the operation of the C-Reactor Facilities. The N-Area consists of two burning/rubble pits that were used between 1951 and 1973 for the disposal of various waste materials including hazardous substances like organic chemicals of unknown use and origin. The F- and H-Areas consist of several former or current disposal, storage, or treatment facilities for hazardous and radioactive

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Remediation of the Four Mile Branch Watershed project will consist of the following:

- Preliminary evaluation of suspect areas to determine if action is necessary;
- Preliminary investigation and analysis of identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation;
- Implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment;
- Analysis of the impact on the watershed;
- Post-action monitoring to ensure that the implemented technology was effective.

- Burial Ground Complex subproject: Obtain final Record of Decision and continue remediation for the 76 acre Old Radioactive Waste Burial Ground including grouting of 22 underground solvent tanks.
- Mixed Waste Management Facility Ground water subproject: Begin design phase of the ground water remediation system. Begin interim action for this subproject.
- F and H-Area Seepage Basin Ground water subproject: Operate two major water treatment units to remove radioactive and hazardous contaminants and establish hydraulic control of tritium contamination.
- H Retention Basin subproject: Complete remedial design for this basin.
- C Reactor Seepage Basin subproject: Complete assessment and begin remedial design at this basin.
- C Reactor Ground water subproject: Continue assessment work at this Subproject.
- Road A Chemical Basin subproject: Continue assessment work at this basin.
- F and H Inactive Sewer Line subproject: Continue remedial action at this basin.
- F Retention Basin subproject: Continue remedial action at this basin.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ C-Area Hazardous Material Unit subproject: Complete remedial action at this unit.			
■ Central Shops Hazardous Material Unit subproject: Begin well monitoring at this subproject.			
■ Four Mile Branch Integrator Operable Unit subproject. Continue monitoring actions at this subproject.			
SR-ER02	28,372	25,140	35,379

Metrics			
Remedial Action/Release Site			
Assessments	4.0	0.0	7.0
Cleanups	4.0	0.0	1.0

SR-ER03 / Lower Three Runs and Operations Project

The Lower Three Runs and Operations project is one of six geographical divisions of the Savannah River Site for the purposes of implementing the Federal Facility Agreements. The Lower Three Runs and Operations project comprises two areas: R-Area and P-Area and Bingham Pump Outage Pits in R-, L-, P-, and K-Reactor Areas. Past disposal practices associated with historical reactor operations have produced waste units within the K-, P-, and R-Reactor Areas. Monitoring well data collected from the P- and R-Reactor Areas indicates the ground water is contaminated with tritium, chlorinated volatile organic, other radionuclides, heavy metals, and sulfate.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Remediation of the Lower Three Runs Watershed project in accordance with Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act will decrease human and environmental risks to acceptable levels. The Lower Three Runs Watershed project will require remediation of primary source material, affected soils, affected surface water pathways, and affected ground water. Remediation of the Lower Three Runs Watershed project will consist of preliminary evaluation of suspect areas to determine if action is necessary, preliminary investigation and analysis of identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation, implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, analysis of the impact on the watershed, post-action monitoring to ensure that the implemented technology was effective.			
■ R-Reactor Seepage Basin subproject: Complete the Record of Decision for this subproject.			
■ P-Reactor Seepage Basin subproject: Complete workplan for this subproject.			
■ P-Reactor Groundwater subproject: Begin workplan development for this subproject.			
■ R-Area Hazardous Material Unit 131-R/1R subproject: Complete workplan for this subproject.			
■ Bingham Pump Hazardous Material Unit subproject: Continue remedial action at this subproject.			
■ Continue Assessment and Remediation Work at the following Operations subprojects: R-Area Acid/Caustic Basins, Gunsite 218, Par Pond Sludge Application Site, Lower Three Runs Ash Basin, Lower Three Runs Integrator Operable Unit, Post Closure Monitoring and Maintenance, Vegetation Removal, Engineering Technical Initiatives, Waste Operations, Watershed Assessment, Waste Certification/Coordination, Technology Demonstration, Facility Support - Operations, Investigation Derived Waste, Site Evaluations, Well Sampling and Analysis.			
SR-ER03	4,385	20,137	26,603

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action/Release Site			
Assessments	4.0	7.0	7.0
Cleanups	4.0	1.0	0.0

SR-ER04 / Pen Branch Project

The Pen Branch Watershed project is one of six geographical divisions of the Savannah River Site for the purpose of implementing the Federal Facility Agreement. The Pen Branch Watershed Project comprises several areas; Central Shops, G-Area, K-Area, and L-Area.

Remediation of the Pen Branch Watershed project in accordance with Comprehensive Environmental Response, Compensation, and Liability Act will decrease human and environmental risks to acceptable levels. The Pen Branch Watershed project will require remediation of primary source material, affected soils, affected surface water pathways, and affected ground water. Remediation of the Pen Branch Watershed project will consist of preliminary evaluation of suspect areas to determine if action is necessary, preliminary investigation and analysis of identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation, implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, analysis of the impact on the watershed and post-action monitoring to ensure that the implemented technology was effective.

- Chemical/Metal Pesticide Hazardous Material Unit subproject: continue remedial action at this subproject.
- Ford Building Seepage Basin Subproject: Complete Record of Decision for this subproject.
- K-Reactor Seepage Basin subproject. Continue remedial action at this subproject.
- L-Area Hazardous Material Unit 131-3L subproject: Continue remedial action at this subproject.
- K-Area Hazardous Material Unit 131-3K subproject: Begin remedial action at this subproject.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Central Shops Sludge Lagoon subproject: Continue assessment work at this subproject			
SR-ER04	10,043	6,866	8,984

Metrics			
Remedial Action/Release Site			
Assessments	4.0	4.0	5.0
Cleanups	4.0	2.0	0.0

SR-ER05 / Steel Creek Project

The Steel Creek Watershed project is one of six geographical divisions of the Savannah River Site for the purpose of implementing the Federal Facility Agreement. The Steel Creek Watershed Project comprises two areas: L-Area and P-Area.

Remediation of the Steel Creek Watershed project in accordance with Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act will decrease human and environmental risks to acceptable levels. The Steel Creek Watershed project will require remediation of primary source material, affected soils, affected surface water pathways, and affected ground water. Remediation of the Steel Creek Watershed project will consist of preliminary evaluation of suspect areas to determine if action is necessary, preliminary investigation and analysis of identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation, implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, analysis of the impact on the watershed, and post-action monitoring to ensure that the implemented technology was effective.

Remediation of the Steel Creek Watershed project will consist of the following:

- Preliminary evaluation of suspect areas to determine if action is necessary;

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Investigation and analysis of the identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation; and			
▸ Implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, and post-action monitoring to ensure that the implemented technology was effective.			
■ L-Area Oil/Chemical Basin subproject: Complete workplan and begin assessment at this subproject.			
■ L-Lake subproject: Begin assessment work at this subproject.			
■ P-Area Hazardous Material Unit 131-P subproject: Begin remedial design at this subproject.			
SR-ER05	2,431	7,451	3,316

Metrics			
Remedial Action/Release Site			
Assessments	2.0	1.0	0.0
Cleanups	2.0	1.0	0.0

SR-ER06 / Upper Three Runs Project

The Upper Three Runs Watershed project is one of six geographical divisions of the Savannah River Site for the purpose of implementing the Federal Facility Agreement. The Upper Three Runs Watershed Project contains five primary Savannah River Site operational areas, in part or in whole: A/M-Area, B-Area, E-Area, F-Area, and the H-Area.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Remediation of the Upper Three Runs Watershed project in accordance with Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act will decrease human and environmental risks to acceptable levels. The Upper Three Runs Watershed Project will require remediation of primary source material, affected soils, affected surface water pathways, and affected ground water. Remediation of the Upper Three Runs Watershed project will consist of preliminary evaluation of suspect areas to determine if action is necessary, preliminary investigation and analysis of identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation, implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, analysis of the impact on the watershed, and post-action monitoring to ensure that the implemented technology was effective.

Remediation of the Upper Three Runs Watershed project will consist of the following:

- Preliminary evaluation of suspect areas to determine if action is necessary;
- Investigation and analysis of the identified waste units and any suspect areas identified through preliminary evaluations to determine further investigation and possible required remediation; and,
- Implementation of remediation technologies to mitigate the impact of contaminants of concern on human health and the environment, and post-action monitoring to ensure that the implemented technology was effective.

- Old F-Area Seepage Basin subproject: Continue post closure well monitoring at this subproject.
- Savannah River Laboratory Seepage Basin subproject: Complete assessment work on this subproject
- A/M-Area Ground water subproject: Complete ground water remediation operations and continue well monitoring at this subproject.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue Ground Water and Vadose Zone Remediation Operations at the following subprojects: Savannah River Laboratory, Southern Sector, Vadose Zone, Purge Water Disposal, M-1 Air Stripper, Western Sector, Met Laboratory.			
■ A-Area Hazardous Material Unit subprojects: Complete assessment and Record of Decision, complete remedial action, and continue well monitoring.			
■ Miscellaneous Chemical Basin/Metal Hazardous Material Unit subproject: Continue remedial action at this subproject.			
■ Non Radioactive Waste Disposal Facility Ground Water subproject: Continue ground water remediation operations and employ bioremediation technology at this subproject.			
SR-ER06	22,091	20,115	15,879

Metrics			
Remedial Action/Release Site			
Assessments	41.0	12.0	4.0
Cleanups	38.0	8.0	3.0

SR-ER07 / Program Management

The purpose of the Environmental Restoration Program Management project is to provide oversight of the operational project watersheds and provide programmatic development. The program is also responsible to ensure that the environment, human health and safety are protected by meeting the prescribed standards derived from Federal, state, and local requirements, and internal Department of Energy requirements. Programmatic support is essential to the Savannah River Site's environmental restoration program.

The following global support activities are found in this project: Safety and Health, Environmental Compliance, Program Analysis and Controls, Estimating Support, and Environmental Restoration quality assurance. Planning support and oversight is also provided to the program globally, thus providing the means to monitor and measure the total Savannah River Site's environmental restoration program performance.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Programmatic development is the crosscutting, strategic, and programmatic initiatives that support the Environmental Restoration Division. The objectives are to lead strategic planning and integration, serve as liaison to the Department of Energy for communication, coordinate external visibility, develop performance measures, and manage program improvements.			
■ Environmental restoration program management will be performed as detailed in the following subprojects: Safety and Health Programs, Program Analysis and Controls, Communications Program, Environmental Compliance support, Environmental Management Information System, Quality Assurance, Cost Estimating support.			
SR-ER07	23,845	11,500	13,470

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-FA02 / F-Canyon Deactivation Project

The F-Canyon deactivation project provides a methodology whereby a facility interim end state is reached ensuring the safety of the worker, public, and environment while effectively reaching the costs associated with the surveillance and maintenance of the surplus facilities while preparing the facility for turnover for eventual disposition.			
■ Continuation of deactivation project planning.			
SR-FA02	0	522	537

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-FA16 / F-Area Monitoring			
The F-Area Monitoring project supports maintaining facilities that have been deactivated in a cost-effective minimum surveillance and maintenance state pending decisions and implementation of final decontamination and decommissioning. Since stabilization processing activities will be continuing in the F-Area facilities through 2002, the F-Canyon, FB-Line, and 235-F facilities will not have achieved a deactivated state.			
The former Naval Fuels Facility, Building 247-F, and associated support facilities, is the only facility that has, and is projected, to undergo deactivation prior to the F-Canyon/FB-Line mission completion. The deactivated state allows minimum surveillance and maintenance actions to be implemented to maintain safety, health, and environmental requirements. Deactivated facilities are monitored and inspected quarterly to ensure safe conditions are maintained.			
■ Continue to maintain 247-F in long-term monitoring.			
■ Complete the Transition Report.			
■ Develop the F-Canyon and 235-F surveillance and maintenance plans for post operational conditions.			
SR-FA16	1,545	738	444

Metrics

This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

SR-FA17 / H-Area Monitoring and Minor Facility Monitoring

This project covers pre-deactivation, deactivation, and post-deactivation surveillance and maintenance in the H-Area and other minor facilities. The H-Area facilities were originally built to provide chemical separations capabilities of nuclear targets and fuels, transformation of plutonium and neptunium solutions to oxide, and the storage of enriched uranium solutions for recovery.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The purpose of the H-Area Monitoring project is to capture the scope and costs for surveillance and maintenance of the facilities that either: 1) are awaiting deactivation, or 2) have been deactivated and are now awaiting a decision on the final disposition.			
■ Only surveillance and maintenance for the reactor heat exchanger repair shop will be funded. Exact scope of the surveillance and maintenance will depend on facility walkdowns and preliminary characterizations undertaken in FY 1998. The current mission for the H-Area will continue. Current funding guidance indicates that deactivation planning and execution activities will begin after FY 2006.			
SR-FA17	0	2,764	4,713

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

SR-FA18 / M-Area Monitoring Project

This project covers operation of the Vendor Treatment Facility through FY 1999, as well as surveillance and maintenance during pre-deactivation, deactivation, and post-deactivation periods in the M-Area. Post-deactivation surveillance and maintenance activities will commence by FY 2012.

- Initial deactivation of the Liquid Effluent Treatment Facility and the process sewer system in accordance with the South Carolina Department of Health and Environmental Control permits will begin in FY 2000. In addition, the Site is contractually responsible for deactivation of the Vendor Treatment Facility and clean closure of tanks. Development of transition documentation and an M-Area interim surveillance and maintenance plan will be completed.

SR-FA18	23,692	11,103	8,087
Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	2,048.0	232.0	0.0
Storage (m^3)	1,254.0	1,432.0	0.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

SR-FA19 / D-Area Monitoring Project

This project covers surveillance and maintenance activities for surplus facilities in D-Area.

- Monitoring of the excess heavy water production facilities will take place.

SR-FA19	0	0	1,261

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

SR-FA20 / Reactors Monitoring Project

The P-, C-, and R-Reactors were formerly used to irradiate target materials for tritium and plutonium production. Each building is composed of five areas: the Disassembly Basin, Purification Area, Assembly Area, Moderator Storage Area, and the Process Room (reactor tank). Operations for all reactors have ceased and each was placed in a cold shutdown mode with no provision for restart. The C-Reactor assembly area is being utilized as a decontamination center for the site. Funding for operation of the Site Decontamination Center and C-Area administrative facilities is included in this project.

During the transition of these facilities from operational status through deactivation to interim long-term monitoring, there is a need to maintain an appropriate level of surveillance and maintenance.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Each reactor's disassembly basin contains contaminated light water, scrap materials, and sludge. Other major hazards associated with the reactor result from continued storage of contaminated heavy water (in the P- and C-Reactor -40 level storage tanks), and presence of fission byproducts and contamination agrees found in a few locations in the buildings. Hazardous materials associated with the building include potential PCB contamination in cables and transformers, and asbestos in flooring, wall panels, insulation and gasket materials. In addition, the P- and C-Area powerhouses are in a relatively advanced state of decay. Some of the problems associated with the latter facilities include friable asbestos, deteriorating piping, ductwork, walkways, and roof.			
■ Perform critical surveillance and maintenance activities.			
■ Preliminary deactivation project planning will be initiated. Current funding guidance indicates that deactivation planning and execution activities will begin after FY 2006 to meet the Resource Conservation and Recovery Act and DOE Orders on waste minimization. The C-Area Decon Facility will be operational in FY 2000. Funding at this level provides continued funding for a limited deactivation project for the P, C, and R disassembly basin and replacement of the 707-C administrative building roof system.			
SR-FA20	8,582	10,081	13,566

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-HL01 / H-Tank Farm

The purpose of the H-Tank Farm facility is to safely store and manage an inventory of 19,400,000 gallons (310,000,000 curies) of liquid high-level radioactive waste in 23 underground storage tanks. This waste has accumulated from past nuclear material production operations at the Savannah River Site. The main long-lived radioactive constituents of this waste are Strontium-90, Cesium-137, Plutonium-238, Plutonium-239, and Plutonium-241. The tanks were built underground to provide shielding from the intense radiation fields of highly radioactive waste. These tanks provide interim storage.

To accomplish its safe storage and waste management mission, the H-Tank Farm utilizes 24-hour surveillance, monitoring inspection sampling and maintenance of 23 underground high-level radioactive waste storage tanks (tank volumes range between 750,000 gal and 1,300,000 gal each) with the following major systems: Liquid Level Monitoring; Leak Detection; Ventilation and Explosive Gas Monitoring; Temperature Monitoring and Cooling Systems; Remote Inspection of the Tanks and Tank Annuli; 24-hour manning of three control rooms; Operations of 2H evaporator system and operation of the Replacement High-Level Waste Evaporator, (which will be operational in FY 1999); which together will provide an average of 2,800,000 gallons of tank volume "space gain" per year; Waste Transfers (between tanks as well as from H-Canyon, and the Defense Waste Processing Facility to/from F-Tank Farm, and to the Extended Sludge Processing; includes transfer line integrity testing); Area Radiation and Storm Water Monitoring; Critical Maintenance Activities (predictive, preventive, and corrective maintenance, equipment troubleshooting, rigging and heavy equipment support, excavations, and facility outage scheduling); and 299-H Maintenance Facility Operation (which has shielded maintenance cells for repairs to highly contaminated equipment).

- Continue radioactive operation of the Replacement High-Level Waste Evaporator Facility.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Perform an estimated 3 inter-area line transfers, 250 canyon receipts, 25 Receiving Basin for Offsite Fuel receipts, and 250 Defense Waste Processing Facility receipts, as well as frequent tank-to-tank transfers within the H-Tank Farm.			
■ Receive an estimated 290,000 gallons of high-level liquid waste from the H-Canyon.			
■ Receive an estimated 2,000,000 gallons of recycle water from the Defense Waste Processing Facility.			
■ Receive an estimated 700,000 gallons of wash water from extended sludge processing.			
■ Evaporate an estimated 1,300,000 gallons of liquid at the 2H evaporator.			
■ Evaporate an estimated 1,500,000 gallons of liquid at the replacement high-level waste evaporator.			
■ Receive an estimated 120,000 gallons of low-level liquid waste from Receiving Basin for Offsite Fuels.			
■ Support the closure of Tank 16.			
■ These funding levels include line-item construction funding of $4,622,000 in FY 1998 for project 89-D-174, Replacement High-Level Waste Evaporator.			
SR-HL01	85,756	91,516	87,851
Metrics			
High-Level Waste			
Storage (m^3)	73,086.0	72,847.0	74,709.0

SR-HL02 / F-Tank Farm

The F-Tank Farm Facility safely stores and manages an inventory of 14,400,000 gallons (170,000,000 curies) of liquid high-level radioactive waste in 20 underground storage tanks. This waste has accumulated from past nuclear material production operations at the Savannah River Site. The main long-lived radioactive constituents of this waste are Strontium-90, Cesium-137, Plutonium-238, Plutonium-239, and Plutonium-241. The tanks were built underground to provide shielding from the intense radiation fields of this highly radioactive waste. These tanks provide interim storage.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
To accomplish its safe storage and waste management mission, the F-Tank Farm utilizes 24-hour surveillance, monitoring, inspection, sampling and maintenance of 20 underground high-level radioactive waste storage tanks (tank volumes range between 750,000 gallons and 1,000,000 gallons each) with the following major systems: Liquid Level Monitoring; Leak Detection; Ventilation and Explosive Gas Monitoring; Temperature Monitoring and Cooling Systems; Remote Inspection of the Tanks and Tank Annuli; 24-hour manning of two control rooms; Operation of Evaporator System (2F evaporator to provide an average of 0.6 million gallons of tank volumes "space gain" per year); Waste Transfers (between tanks as well as from F-Canyon and to/from H-Tank Farm; includes transfer line integrity testing); Area Radiation and Storm Water Monitoring; Critical Maintenance Activities (predictive, preventive, and corrective maintenance, equipment troubleshooting, rigging and heavy equipment support, excavations, and facility outage scheduling).			
■ Perform an estimated 3 inter-area line transfer, 400 canyon receipts, as well as frequent tank-to-tank transfers within the F-Tank Farm.			
■ Receive an estimated 220,000 gallons of high-level liquid waste from the F-Canyon.			
■ Receive an estimated 370,000 gallons of wash water from the extended sludge processing.			
■ Evaporate an estimated 1,000,000 gallons of liquid.			
SR-HL02	51,347	57,479	60,737
Metrics			
High-Level Waste			
Storage (m^3)	**55,107.0**	**53,202.0**	**50,689.0**

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-HL03 / Waste Removal Operations and Tank Closure

This project includes four specific areas of scope related to waste removal from high-level waste tanks and facilities, as well as closure of high-level waste tanks and facilities. Scope areas are: 1) waste removal operations including removing the high-level waste from the waste tanks and water washing the tanks; 2) demonstrating alternative waste removal technologies that are potentially more cost effective than the baseline technologies; and 3) closing each individual tank or facility after waste removal and water washing are complete.

Specific scope is as follows: Waste Removal Operations - Tanks 1-15, 17-39, and 43-47 contain either salt or sludge or, in some cases both. The waste will be removed from each tank by operating slurry pumps and transfers jets, which are being retrofitted on each tank (3 slurry pumps and 1 transfer jet for each salt tank; 4 slurry pumps and 1 transfer pump for each sludge tank). The waste removal activities include adding large amounts of corrosion inhibited water to a tank; operating the slurry pumps to suspend sludge or dissolve salt; transferring the waste out by transfer jet; and then lowering the slurry pumps and repeating the process until the tank is empty. The interior of the tank is then water washed by operating a large 10,000 gallon heated water system connected to rotary spray jets. For those tanks with contaminated annuli, a similar process will be employed for annulus washing. Process samples, waste volume measurements and tank inspections are conducted throughout the waste removal process. Similar activities will take place in process facilities such as evaporator cells and diversion boxes.

Waste Removal Demonstrations - Three new salt removal technologies will be demonstrated individually and in combination. modified density gradient, water jetting and a single slurry pump. Funding is also allocated from sludge/zeolite heel demonstrations in Tanks 18 and 19. The heel removal technologies to be demonstrated are in the process of being defined

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Tank/Facility Closure - After waste removal and water washing, each tank or facility (i.e. evaporator) will be closed. Samples will be taken of the residual waste; a performance evaluation and tank-specific closure module will be developed; and regulatory approval to proceed will be obtained. The tank or facility will then be physically isolated from other tanks/facilities. Each tank will be filled with three different types of grout in distinct layers such that the bottom layer of "reducing grout" will chemically bind residual waste; the middle layer of "controlled low strength grout" will prevent subsidence; and the top layer of "strong grout" will prevent intrusion. All piping and electrical connections will be cut, capped, and sealed to isolate each tank. All openings into each tank will be sealed with "strong grout". Each tank will be left in a low surveillance/maintenance condition.			
■ Waste Removal Operations - complete washing of Tank 8 sludge and transfer to Tank 40.			
■ Support completion of the H-Tank Farm electrical and instrument upgrades.			
■ Support installation of Tank 7 slurry pumps.			
■ Support construction of Tank 11 waste removal facilities.			
SR-HL03	1,603	3,099	1,943

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-HL04 / ITP/ESP/LW Operations

This project provides funding for the pre-treatment of liquid high-level radioactive waste to enable final processing at the Defense Waste Processing Facility into a safe stable form for long-term storage/disposal. This waste (33,800,000 gallons, 480,000,000 curies) has accumulated from past nuclear material production operations at the Savannah River Site. The main long-lived radioactive constituents of this waste are Sr-90, Cs-137, Pu-238, Pu-239, and Pu-241. Extended Sludge Processing pre-treats the sludge portion of tank waste to be processed at Defense Waste Processing Facility into vitrified glass by reducing the aluminum and soluble salt content through an aluminum dissolution step and multiple washing cycles. These facilities are operated remotely to protect personnel from the intense radiation fields from this highly radioactive waste. The In-Tank Precipitation and Late Wash Facilities were expected to pre-treat the salt portion of the high-level waste. Due to technical issues concerning the generation of larger than anticipated amounts of benzene all activities have been suspended. A salt processing systems engineering evaluation is in progress. All known salt processing options will be evaluated against the high-level waste system requirements and the best option will be selected in FY 2000. All monitoring and surveillance activities to maintain the In-Tank Precipitation tanks and facilities in a safe configuration will continue. All activities in support of the High-Level Waste Salt Alternative are funded in SR-HL13, Salt Disposition.

Scope includes: 24 hour surveillance, monitoring, inspection, sampling and maintenance of six 1,300,000 gallon high-level waste tanks with the following systems: Liquid Level Monitoring and Leak Detection; Ventilation and Explosive Gas Monitoring; Temperature Monitoring and Cooling Systems; Remote Inspection of the Tanks and Tank Annuli; 24-hour Manning of the In-Tank Precipitation Control Room; Chemical Addition; Sludge Washing (with 2-3,000,000 gallons of water per year to dissolve the aluminum present in the sludge); Waste Transfers (between tanks as well as to/from H-Tank Farm, and to Defense Waste Processing Facility; includes transfer line integrity testing); Critical Maintenance Activities (predictive, preventive, and

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Extended Sludge Processing			
■ Start and complete washing the sludge in Tank 40.			
■ Continue to feed Defense Waste Processing Facility from Tank 51 to produce 100 cans			
In-Tank Precipitation			
■ Maintain ventilation and explosive gas monitoring.			
■ Maintain liquid level monitoring and leak detection.			
■ Perform surveillance and maintenance activities as necessary to keep the facility in a safe configuration.			
Late Wash			
■ Perform surveillance and maintenance activities as necessary to keep the facility in a safe configuration.			
■ Major activities are dependent on the results of the salt processing systems engineering evaluation.			
SR-HL04	75,233	48,374	58,446

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

SR-HL05 / Vitrification

The Defense Waste Processing Facility project provides treatment to immobilize the Savannah River Site's liquid high-level radioactive waste in a solid glass waste form, which prevents the waste from leaching to the environment. Approximately 33,800,000 gallons of liquid, high-level radioactive waste are currently stored in 43 underground storage tanks in the F-Tank Farm and the H-Tank Farm. These tanks were designed for interim storage only, and many have already exceeded their intended design life. Most waste operations are conducted remotely, to shield workers from exposure to the intense radiation from Strontium-90, Cesium-137, Plutonium-238, Plutonium-239, Plutonium-241, and other radionuclides in the waste.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The scope within the project includes 24-hour operation of the Defense Waste Processing Facility Vitrification Plant to immobilize high-level radioactive waste in glass including: 24-hour manning of the Defense Waste Processing Facility Control Room; receiving transfers of sludge waste from extended sludge processing; sending transfers of recycle waste to the H-Tank Farm; adjusting and preparing feed for the glass melter; melting the waste into molten glass; pouring the molten glass into stainless steel canisters; inserting and welding canister plugs; decontamination canisters; transporting canisters to the Glass Waste Storage Building; critical maintenance activities (predictive, preventive, and corrective maintenance, equipment troubleshooting, rigging and heavy equipment support, excavations, and facility outage scheduling); and sample analyses to confirm waste glass quality meets Federal Repository requirements.			
■ The Defense Waste Processing Facility will produce 100 canisters of sludge-only waste glass.			
SR-HL05	126,864	131,959	126,614

Metrics			
High-Level Waste			
Treatment (m^3)	871.0	696.0	348.0
Canisters Produced (m^3)	250.0	200.0	100.0

SR-HL06 / Glass Waste Storage

The Glass Waste Storage Building provides safe interim storage of the highly radioactive, waste glass filled canisters produced by the Defense Waste Processing Vitrification Facility until a Federal Repository is available. This project includes all Glass Waste Storage building activities required to safely store the waste glass canisters, including operations and maintenance of Glass Waste Storage Building #1: 24-hour operation, monitoring, inspection, and maintenance of Glass Waste Storage Building #1 and the highly radioactive waste glass canisters stored there, including operation and maintenance of forced air ventilation systems to remove radioactive decay heat, and monitoring and maintenance of radiation monitors and temperature sensors.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Critical maintenance activities include: predictive, preventive, and corrective maintenance, equipment troubleshooting, and rigging and heavy equipment support.			
■ Continue storage of all vitrified glass canisters poured at the Defense Waste Processing Facility in previous years, plus storage of the 100 sludge-only canisters of vitrified glass projected to be poured at the Defense Waste Processing Facility in the current year.			
SR-HL06	324	599	368
Metrics			
High-Level Waste			
Storage (m^3)	320.0	452.0	519.0

SR-HL07 / Effluent Treatment Facility

This project includes all Effluent Treatment Facility activities required to remove the hazardous and low-level radioactive contaminants from the low-level wastewater generated in the F and H Separations and the Tank Farm Areas. This wastewater is processed at the Effluent Treatment Facility until it meets the National Pollutants Discharge Elimination System standards and subsequently released to a permitted outfall. Operation of the Effluent Treatment Facility directly support F- and H-Tank Farms, as well as the Savannah River Site high-level waste vitrification process. It is also required to support F- and H-Area Nuclear Materials Stabilization activities (Projects SR-NM01 and SR-NM02) to meet the Defense Nuclear Facilities Safety Board Recommendation 94-1 commitments.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Effluent Treatment Facility is operated under a South Carolina Department of Health and Environmental Control Waste Water Permit and is required for the Site to meet regulatory requirements for discharge to an outfall. Activities include surveillance and maintenance of a vast wastewater collection system including two 32,000 gallon pumping stations, two 2,000,000 gallon high activity plastic-lined cooling water basins, two 6,000,000 gallon rubber-lined low activity retention basins, and two 450,000 gallon collection tanks. Also included is the operation of a large wastewater treatment plant that includes pH adjustment, micro filtration, ion exchange, organic removal, mercury removal, evaporation and sampling and release of 18,000,000 gallons of treated water per year. The two 2,000,000 gallon basins are reserved to contain a postulated canyon cooling water accident.			
■ Process wastewater as required to support canyon and tank farm operations.			
■ F/H Cooling Water Basins will be relined/repaired to address leak detection upgrades.			
■ Complete Digital Control System upgrades for Effluent Treatment Facility operations.			
■ Return Treated Water Tank #1 to service.			
SR-HL07	17,900	16,539	17,580

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-HL08 / Saltstone			
The Saltstone Facility is designed to receive, treat, and dispose of the mixed low-level radioactive liquid salt solution resulting from the In-Tank Precipitation process. Currently, due to technical issues concerning the generation of larger than anticipated amounts of benzene at the In-Tank Precipitation, all activities for that process have been suspended. A salt processing system engineering evaluation is in progress. All known salt processing options will be evaluated against the high-level waste system requirements and the best option will be selected in FY 2000. All monitoring, surveillance and maintenance activities to maintain the saltstone facility in a standby mode will continue until the salt alternative is selected.			
Critical maintenance activities include: predictive, preventive, and corrective maintenance, equipment troubleshooting, excavations and grounds maintenance, administration of the paving and heating, ventilation, air conditioning subcontracts, preparation of purchase requisitions and ordering and staging parts and materials; preparation of spare parts data sheets, and facility outage scheduling.			
■ Perform surveillance and maintenance activities, as necessary, to keep the facility in a safe configuration.			
SR-HL08	8,096	1,102	1,222

Metrics			
Low-Level Waste			
Treatment (m^3)	1,283.0	0.0	0.0
On-Site/Commercial Disposal (m^3)	2,052.0	0.0	0.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

SR-HL12 / High-Level Waste Removal

This project is twofold: 1) to perform the capital improvements necessary to enable the high-level waste system to maximize canister production given the current scientific understanding to process chemistry; and 2) to ensure a continuous supply of pre-treated sludge and salt precipitate feed to Defense Waste Processing Facility. The project will enable the Defense Waste Processing Facility to process sludge feed and upon selection of a salt pre-treatment alternative, to process salt precipitate feed, provide facility modifications to replace aging service piping and other service utilities on the H-Tank Farm East Hill (this area includes Tanks 38-43, 49-51, Extended Sludge Processing, and the 2H Evaporator) and waste removal equipment for all high-level waste tanks.

The operation required to remove waste from high-level waste tanks and to close those tanks are funded by Project Baseline Summary SR-HL03, Waste Removal Operations and Tank Closure.

- Waste Removal
  - Complete construction bid package, award contract and initiate construction on Tank 7.
  - Complete construction and initiate run in and installation of slurry pumps for Tank 11.
- These funding levels include line-item construction funding of $18,220,00 in FY 1998; $15,214,000 in FY 1999; and $8,987,000 in FY 2000 for project 93-D-187, High-Level Waste Removal from Filled Waste Tanks.

SR-HL12	23,923	22,874	14,433

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-HL13 / Salt Disposition

The purpose of this activity is to select, design, construct, and startup the necessary facilities to prepare and treat the salt waste material for processing in the Defense Waste Processing Facility. The failure of the In-Tank Processing Facility identified in January 1998 due to very high levels of benzene production necessitated this major change. A systems engineering team was formed to study all possible alternatives. This resulted in a recommendation to pursue three options with a final selection of a process in late FY 2000. The three options are: Direct Grout, Ion Exchange, and Small Tank In-Tank Processing.

A supplemental Environmental Impact statement will be prepared based on these three options (plus a no action alternative) with a preferred alternative to be selected in late FY 1999. A Record of Decision is planned for late FY 2000.

In conjunction with the National Environmental Policy Act substantial research and development activities, including design and construction of pilot/prototype facilities, will be under taken to demonstrate the ability of these options to meet safety, production, and cost goals. After selection of a preferred alternative additional confirmatory research and development and conceptual design work will take place. Final design and construction will be accomplished and facility startup initiated.

- Complete supplemental Environmental Impact Statement and issue Record of Decision.
- Continue research and development activities in hot cell.
- Continue conceptual design activities.
- Complete and operate pilot/prototype facilities.

SR-HL13	0	12,983	42,129

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-IN11 / Infrastructure Line-Item			
This activity encompasses up-front planning, design, and budget determinations and documentation required to support future infrastructure capital projects and the operating cost funded support needed to execute authorized capital projects.			
This project serves a dual function:			
▸ It is used to plan, budget, and fund line-item preconceptual and conceptual design activities. These activities are typically started at least three years in advance of actual start of a construction line-item project.			
▸ It is used as a collection point to reflect outyear costs projected in planning space for line-items that are at least one year past the budget year. For example, in this budget submission, the Total Project Costs for construction line-item projects projected to start in FY 2000 and beyond are collected in this Project Baseline Summary for planning purposes.			
Any projects planned for development have been given a preliminary evaluation against Environmental Management risk criteria and are considered to have a strong probability of being supported for further development and/or funded for execution as a critical site need.			
■ Complete up-front planning for the Savannah River Technology Center ventilation upgrade project.			
SR-IN11	0	1,274	200

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-IN12 / Operating Projects

Responsibility for these functions are associated with the general concept of "Landlord" functions and are necessary for the general operation of the Site, as well as for the care of the Site's shared infrastructure components such as bridges, roads, and support activities that have been centralized for cost effectiveness. This activity encompasses infrastructure support for the Department of Energy, United States Forestry Service, Savannah River Ecological Laboratory, and Wackenhut Services, Inc. Services provided are in the nature of landlord support and are directly necessary for the safe and effective operation of these organizations and for the performance of their activities.

Operational activities include all site baseline activities necessary to operate the Site Infrastructure program including the following:

- Reimbursed work for United States Forestry Service in support of the Savannah River land management.
- Capital equipment projects for the purchase and installation of new equipment or upgrades to replace obsolete equipment to support Priority I: safe storage of nuclear materials; regulatory requirements and commitments, and Priority 2: support of mission critical operations.
- General Plant Projects for the design (excluding conceptual), construction, installation or other acquisition of land, property right, buildings, structures, utility lines, roads or facilities necessary to reduce or eliminate health, fire, safety, and security problems in support of general site infrastructure and the overall Site mission consistent with the Department of Energy requirements.

- Requested infrastructure support for the Department of Energy's direct Savannah River Site activities. Such support includes telephone systems, computer support, and access to the site network, site radios, transportation, waste hauling, janitorial services, support for the Department of Energy procurements, printing and document reproduction services.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Capital Equipment and General Plant Projects designated as necessary for safe storage of nuclear radioactive materials and those that are regulatory required that have been postponed from FY 1999 and earlier will be initiated and/or completed.			
■ Capital Equipment and General Plant Projects designated as "Infrastructure Core" activities that have been deferred from FY 1999 and earlier will be initiated and/or completed.			
■ Capital Equipment Projects to be funded include: replace In-Cell Crane, 773-A IH/Radcon protable monitoring equipment, replace HVAC Units in 710-17N, replace obsolete TLD System, replace environmental lab equipment, ALD core analytical instrument replacement, and replace Isokinetic System Gas Chromatographs.			
■ General Plant Projects to be funded include: F-Area Retention Basin, A-01 Outfall Constructed Wetlands, Mini-Melter, 786-A, replace culvert at Central Shop, Replacement of B-Wing hood exhaust, 773-A, replace six obsolete distribution panels, 772-F, and replace B-Area well hunter.			
SR-IN12	10,207	18,246	32,693

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-SF01-LT / K-Reactor Spent Nuclear Fuel Project (Post 2006)

The K-Reactor Spent Nuclear Fuel project provides basin storage of the Savannah River Site spent nuclear fuel awaiting stabilization, as well as storage for heavy water and nuclear materials awaiting disposition. The K-Area also serves as an administrative and operational support location for all spent nuclear fuel storage activities.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
A mission for interim storage of special nuclear material from the Department of Energy Rocky Flats Field Office has been added to the scope of the K-Reactor project With addition of this mission, the K-Reactor area will not be available for deactivation in FY 2002 as previously planned: Storage of Rocky Flats special nuclear material is scheduled to continue until FY 2012. This change in mission requires this project baseline summary to be moved from the Site/Project Completion account to the Post 2006 Completion account in FY 2000. The FY 1998 and FY 1999 associated funding levels are $29,393,000 and $25,845,000, respectively.			
■ Continue surveillance and maintenance, basin operations, and heavy water and highly enriched uranium surveillance.			
■ Disposition of tritium material located in K-Basin is expected.			
■ Maintain High Activity Moderator in standby, operated as necessary until completion of the heavy water program.			
■ Begin receipt of plutonium metal from Rocky Flats.			
SR-SF01-LT	0	0	33,410
Metrics			
Spent Nuclear Fuel Stabilized			
In-Stabilization Process / Not Stabilized (m^3)	0.0	0.0	7.5
In-Stabilization Process / Not Stabilized (MTHM)	0.0	0.0	0.9

SR-SF02 / L-Reactor Spent Nuclear Fuel Project

The purpose of the L-Reactor Spent Nuclear Fuel project is to control the water quality where fuel rods are stored and to carry out all activities that apply to fuel handling, storage, and shipping to other facilities. The L-Area contains the 105-L Reactor Building (1,000,000 square feet) along with support facilities. Inside the 105-L Reactor Building is the disassembly basin, which stores the Savannah River spent nuclear fuel and will be used to store spent nuclear fuel from off-site research reactors The L-Reactor disassembly area includes equipment to control basin water quality for the storage of spent nuclear fuel. The basin walls are below ground and are thick steel-reinforced concrete. The basin contains approximately 3,500,000 gallons of water and varies in depth from 17 to 30 feet.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue safe storage of Foreign Research Reactors/Domestic Research Reactor fuel. Continue facility surveillance and maintenance activities.			
■ Commence the deinventory of the Savannah River reactor spent nuclear fuel (ship Mark 16 and 22 fuel to H-Canyon) as mandated in the Defense Nuclear Facilities Safety Board Recommendation 94-1.			
■ Continue storage of heavy water inventory until disposition is determined.			
■ Projected receipts for Receiving Basin for Off-site Fuels and L-Basin combined:			
▸ 40 casks of foreign research reactor fuel;			
▸ 13 casks of domestic research reactor/Department of Energy fuel;			
▸ 12 casks high flux induction reactor fuel, for a total of 65 casks; and			
■ Projected receipts are for planning purposes only. These projections change due to numerous conditions beyond the control of the Department of Energy or the management and operating contractor.			
■ In addition to this funding, the Department's Cost of Work for Others Program will include $11,478,000 in FY 1998; $12,500,000 in FY 1999; and $9,700,000 in FY 2000 of equal budget authority to support receipts for the foreign research reactor receipt program implementation at both the L-Reactor and the Receiving Basin for Offsite Fuels.			
SR-SF02	20,108	31,826	36,187

Metrics			
Spent Nuclear Fuel			
Stable, Not Disposition-Ready (m^3)	8.1	18.3	23.6
Stable, Not Disposition-Ready (MTHM)	0.8	2.1	2.7
In Stabilization Process / Not Stabilized (m^3)	17.1	17.0	17.0
In Stabilization Process / Not Stabilized (MTHM)	2.7	2.7	2.7
Made Disposition-Ready During Period (m^3)	0.0	0.1	0.0

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-SF03 / RBOF Spent Nuclear Fuel Project

The Receiving Basin for Offsite Fuel spent nuclear fuel project includes: basin operations in Receiving Basin for Offsite Fuel to control the water quality where fuel rods are stored, reactor deionizer regeneration, administrative programs like SIRIM 9B reporting requirements, and all activities that apply to fuel receipt, handling, storage, and shipping to other facilities.

The fuel rods have been irradiated and are being stored until a final disposition is approved. There are certain casks that Receiving Basin for Offsite Fuel can handle directly that L-Basin cannot, such as the TN7. A minimal number of on-site shipments from Receiving Basin for Offsite Fuel to L-Basin are needed to conserve Receiving Basin for Offsite Fuel space reserved for those fuels and casks that can only be handled in Receiving Basin for Offsite Fuel. Spent nuclear fuel will begin to be transferred to the Transfer Treatment and Storage Facility for interim storage in FY 2005 assuming that the facility is available for receipts at that time The Receiving Basin for Offsite Fuel and L-Basin will be capable of handling combined receipts of foreign and domestic reactor spent nuclear fuel at an average of up to seven casks per month between FY 1998 and FY 2005.

- Continue surveillance and maintenance and basin management activities to maintain water quality enabling the safe receipt and storage of spent nuclear fuel and ensuring that the facility continues to pose acceptable risk to the environment, site workers, and the general public. The facility will continue to be maintained in accordance with the safety basis requirements with cost effective management, planning, and oversight.
- Projected receipts of offsite fuel (Receiving Basin for Offsite Fuel and L-Basin combined) for FY 2000 will be:
  - 40 casks of Foreign Research Reactor fuel;
  - 13 casks of Domestic Research Reactor/Department of Energy fuel; and,
  - 12 casks high flux induction reactor DOE Oak Ridge fuel, for a total of 65 casks.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Projected receipts are for planning purposes only. These projections change due to numerous conditions beyond the control of the Department of Energy or the management and operations contractor. Pending the National Environmental Protection Agency determination, it is assumed that the Savannah River Site Spent Nuclear Fuel Environmental Impact Statement Record of Decision will direct Receiving Basin for Offsite Fuel to deinventory "problematic" fuel as defined in the Research Reactor Task Team Report to F- or H-canyon for processing starting in FY 1999/2000. This consists of metallic uranium fuels (EBRII/SRE), oxide target materials, and failed and sectioned fuels (listed in table 5.2-1 of the RRTTR). The Receiving Basin for Offsite Fuel refurbishment capital equipment/general plant project will commence upgrades to the facility and its system. Specific accomplishments will include reactor and Receiving Basin for Offsite Fuel deionizer regeneration.			
■ Some spent nuclear fuel can be moved from Receiving Basin for Offsite Fuels to the L-Reactor basin to optimize Receiving Basin for Offsite Fuels and L-Basin space to support future spent nuclear fuel receipts. One shift of operators will be eliminated at the Receiving Basin for Offsite Fuels based on a transfer of fuel receipts to the L-Reactor.			
SR-SF03	19,155	18,206	11,773

Metrics			
Spent Nuclear Fuel			
Stable (m^3)	20.1	22.3	24.1
Stable (MT)	21.1	21.4	21.6
In Stable Process / Not Stabilized (m^3)	35.1	35.1	35.1
In Stable Process / Not Stabilized (MTHM)	19.0	19.0	19.0

SR-SF04-LT / Heavy Water D-Area (Post 2006)

The Heavy Water Processing project provides for the consolidated storage of heavy water into the K-Reactor. The K-Reactor was previously modified to provide storage of 3,000 drums of heavy water.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Heavy Water Processing project was included in the Site/Project Completion account with the cost of operations offset by heavy water sales revenue. Previously, heavy water rework and Dupont water operations in D-Area were scheduled to cease by December 2000. Recent events surrounding the sale of heavy water currently places the Heavy Water program into the Post 2006 Completion account in FY 2000.			
■ Continue heavy water re-work operations through December 2000 and Dupont Water through June 2000 to process identifiable inventory.			
■ Operate Moderate Purification Facility and Technical Purification Facility as required according to the Moderator Management Plan for inventory processing.			
■ The above activities will be modified if a contract to sell the heavy water is promulgated in FY 1999.			
■ Finalization of planning for FY 2001 deinventory and demobilization of D Area, including plans for such items as construction drying of towers, Technical Purification Facility/Moderator Purification Facility lay up, line drying and heavy water shipping.			
SR-SF04-LT	0	0	4,984

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-SF09 / Spent Nuclear Fuel Treatment and Storage

The Department of Energy has responsibility for receipt and storage of a substantial quantity of aluminum-based research reactor spent nuclear fuel at the Savannah River Site over the next 40 years. Based upon the 1996 Research Reactor Spent Nuclear Fuel Task Team Report recommendation and the Foreign Research Reactor Environmental Impact Statement Record of Decision, new services will be required for receipt, characterization, conditioning, packaging and dry storage of spent nuclear fuel pending ultimate disposal. To implement the preferred alternative in the Savannah River Site Spent Nuclear Fuel Management Environmental Impact Statement (Melt and Dilute Process), the Department of Energy would construct a melt and dilute facility in the existing 105-L Reactor Building at the Savannah River Site and would build a dry-storage facility in L-Area near the 105-L Reactor Building. The proposed Treatment and Storage Facility will include remote handling and heavy lifting (cask handling) capability, hot cells, and retrievable dry storage space for spent nuclear fuel assemblies. The mission of the Treatment and Storage Facility will be to prepare the spent nuclear fuel for interim dry storage in a "road-ready" form for shipping to and ultimate disposal in a Nuclear Regulatory Commission licensed geologic repository.

Significant development work and independent reviews have been conducted over the past three years to better define and understand the proposed project. For example, technology development is nearing completion having been validated through bench scale and small testing using surrogate materials. The concept has also been validated by third party small scale testing (Argonne National Laboratory) using irradiated samples. Through a Memorandum of Understanding with the Savannah River Site, the Nuclear Regulatory Commission is conducting an on-going review of the research and development results to ensure that any technical issues are identified and addressed early in the process. In a June 1998 letter report, the Nuclear Regulatory Commission concluded that melt and dilute would be an acceptable concept for geologic disposal of aluminum-based spent nuclear fuel. As final proof-of-concept, Savannah River is

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Spent Nuclear Fuel Treatment and Storage Facility is to provide for the receipt and storage of approximately 30,000 domestic and foreign research reactor spent nuclear fuel assemblies currently in existing wet storage basins or expected to be received at the Savannah River Site over the next 40 years.			
■ A design-only line-item construction project to develop detailed design for the Spent Nuclear Fuel Treatment and Storage Facility will be initiated. The facility would be built under a subsequent line-item in FY 2003. Preliminary and final design (Title I and Title II) of the project will be initiated, including vendor supplied engineered equipment design technology. The design process will be accomplished in two parts: non-process related (interim dry storage modules and support utilities) which will begin in early FY 2000, and melt and dilute process design integration into the 105-L facility - which will begin later in the fiscal year with input from the L-Area pilot demonstration as discussed above. Both design efforts will be integrated into validating/baselining the FY 2003 construction project.			
■ These funding levels include design only line-item construction funding of $7,000,000 in FY 2000 for project 00-D-401, Spent Nuclear Fuel Treatment and Storage Facility.			
SR-SF09	950	1,455	11,500

Metrics
No quantifiable corporate performance measures are associated with this project.

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(dollars in thousands)

FY 1998	FY 1999	FY 2000

SR-SW01 / Consolidated Incinerator Facility

The Consolidated Incinerator Facility provides the Savannah River Site the capability for safe treatment, by incineration, of combustible, low-level radioactive wastes, hazardous wastes, and mixed wastes (those containing both hazardous and radioactive constituents). These wastes are received at the Consolidated Incinerator Facility for incineration as either liquids or solids. The facility is operated in accordance with the South Carolina Hazardous Waste Management Regulations, and the Resource Conservation and Recovery Act. Operation of the Consolidated Incinerator Facility will contribute to implementation of the Savannah River Site Treatment Plan (WSRC-TR-94-0608), which established the requirement for the Consolidated Incinerator Facility to treat specified mixed waste streams in accordance with the Federal Facility Compliance Act.

Waste incineration is regulated by state and Federal agencies and is a well-established means of destroying or reducing the volume of hazardous materials. Waste treatment by incineration at the Consolidated Incinerator Facility achieves a waste destruction efficiency of not less than 99.99 percent. Ash produced by the combustion process, as well as blowdown from off-gas treatment processes, is stabilized by solidification and transferred to either a Resource Conservation and Recovery Act licensed storage facility or to a hazardous/mixed waste disposal facility depending on its Resource Conservation and Recovery Act designation, each of which is managed in accordance with the Environmental Protection Agency Land Disposal Restriction regulations.

During its designed service life of 30 years, the Consolidated Incinerator Facility will incinerate approximately 1,000,000 pounds of solid waste and 1,000,000 pounds of liquid waste each year. Waste streams processed will include:

- Low-level solid waste from several on-site sources;
- Low-level radioactive liquid waste (aqueous and organic);
- Liquid radioactive organic waste (benzene from the Defense Waste Processing Facility);
- Hazardous and mixed solid wastes from several on-site facilities; and

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Hazardous and mixed liquid wastes (aqueous and organic including solvent material from past and present canyon operations.			
■ The facility will continue incinerating waste during steady-state operations to support the Site Treatment Plan.			
■ Capital equipment and general plan projects will be initiated, as necessary.			
SR-SW01	24,873	23,255	26,045

Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	853.0	809.0	760.0
Storage (m^3)	0.0	149.0	149.0
Low-Level Waste			
Treatment (m^3)	0.0	1,422.0	0.0

SR-SW02 / Transuranic Waste Project

As a result of nuclear materials production in the Department of Energy complex, the Savannah River Site currently stores approximately 11,000 m^3 of waste contaminated with transuranic isotopes. An estimated 10,000 m^3 is expected to be generated through FY 2028. A portion, approximately one-third by volume of the legacy waste managed as transuranic waste, is estimated to have an activity level of less than 100 nCi/g and could be dispositioned as low-level waste or as mixed low-level waste with proper characterization.

The goal of the Transuranic Waste project is to properly characterize the waste to segregate the low-level waste and mixed low-level waste from the transuranic inventory, perform the necessary processing/treatment to meet the appropriate low-level/mixed low-level waste disposal criteria, and to certify and dispose of all transuranic and mixed transuranic waste at the Waste Isolation Pilot Plant in New Mexico.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The project has the following objectives:

- Transuranic Waste Storage Pad Base Operations, which include
  - Receipt and storage of newly generated waste;
  - Inspection and maintenance of transuranic waste storage pads and transuranic waste containers; and
  - The removal of earthen cover and retrieval of 8,809 55 gallon drums on five transuranic waste storage pads.
- The Low-Level Waste Disposition initiative, which provides for the disposal of approximately one thousand 55 gallon drums of low-level waste formally managed as transuranic waste.
- The Transuranic Waste Drum Segregation initiative, which provides for assays drums of waste to segregate transuranic waste from low-level waste and to segregate mixed transuranic waste from mixed low-level waste. Initial efforts involve:
  - The Repackaging Initiative, which provides for the disposal of approximately 200 waste containers. These containers consist of used high-efficiency particulate air filters that can be certified as low-level waste following assay. Repackaging is necessary for disposal efficiency and fire prevention reasons.
  - The Ship to the Waste Isolation Pilot Plant Initiative, which provides for the necessary characterization, certification, and transportation systems to support the initial Savannah River Site shipments of transuranic waste to the Waste Isolation Pilot Plant. These systems will be used until the Transuranic and Mixed Waste Containment Building (future line-item) can be designed and constructed.
  - The Mixed Low-Level Waste Disposition Plan, which investigates the feasibility of sending waste to the Consolidated Incineration Facility, or to another Department of Energy facility as identified through the Environmental Management Integration effort.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
– The Pu-238 On-Site Disposal Initiative, which evaluates the possibility of expanding disposal performance assessments at the Savannah River Site to determine if Pu-238 contaminated waste can be safely disposed on-site.			
■ Maintain existing inventory in a safe configuration.			
■ Make ready first three shipments of Savannah River transuranic waste for shipment to the Waste Isolation Pilot Plant.			
■ Receive and store newly generated transuranic waste.			
■ Continue venting of drums stored on pads.			
SR-SW02	9,220	13,991	10,602

Metrics			
Transuranic Waste			
Storage (m^3)	10,837.0	11,527.0	11,616.0
Ship to DOE Disposal Site (m^3)	0.0	44.0	35.0

SR-SW03 / Mixed Low-Level Waste Project

The mixed waste streams at the Savannah River Site were and are generated from a variety of activities and waste generators across the Site, including the tritium facilities, separations, reactors, high-level waste tank farms, reactor materials, solid waste, and construction. Due to the lack of mixed waste treatment facilities within the Department of Energy complex and the commercial sector, the vast majority of these waste streams have been in storage well in excess of one year, and do not meet the intent of the Land Disposal Restrictions regulations, i.e. has not been treated within 1 year of its Accumulation Start Date. As a result, the Savannah River Site has entered into a compliance agreement (Consent Order, 95-22-HW) with the South Carolina Department of Health and Environmental Control concerning the treatment of these waste streams. This compliance agreement requires implementation of the Savannah River Site Treatment Plan.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The mixed waste project will be managed with the overall goal of achieving full Resource Conservation and Recovery Act LDR compliance such that there is no legacy or newly generated mixed waste stored within the Savannah River Site mixed waste facilities for longer than one year. This will be accomplished by either developing or identifying appropriate treatment methods to meet the commitments of the Site Treatment Plan and also developing and/or identifying appropriate disposal alternatives for the final disposition of the treated mixed waste.

Three key activities in the management of the various mixed waste streams are storage, treatment (including any characterization activities required prior to treatment), and disposal. A breakdown of these activities is provided below:

Mixed Waste Receipt and Storage activities Include.

- Receipt of newly generated waste;
- Verification that the waste meets the facility waste acceptance criteria; and
- Placement of the waste in storage and the surveillance and maintenance of the stored waste.

Waste treatment activities are conducted to treat the waste prior to disposal to ensure that the requirements of Resource Conservation and Recovery Act and the Federal Facility Compliance Agreement of 1992 are met. These activities include:

- Characterization and preparation for the Consolidated Incinerator Facility treatment of a large portion of the legacy waste; and
- Characterization and preparation of non-Consolidated Incinerator Facility waste streams for off-site shipment and treatment.

Disposal of treated mixed waste activities includes.

- Identifying the most equitable and best technical location for disposal of all the Savannah River Site mixed waste inventory; and,
- Characterizing, preparing, and shipment of treatment residuals for disposal.

- Continue storage operations for various mixed waste streams.
- Continue decontamination of low-level waste lead.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue operations of New Solvent Storage Tanks.			
■ Submit an annual update to the Site Treatment Plan.			
■ Complete the mixed waste facility upgrade project.			
■ Treat and dispose of small quantities of mixed low-level waste.			
SR-SW03	2,854	4,994	5,845

Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	282.0	32.0	35.0
Storage (m^3)	867.0	695.0	1,011.0
On-Site/Commercial Disposal (m^3)	0.0	0.0	50.0

SR-SW04 / Low-Level Waste Project

The low-level waste streams at the Savannah River Site were and are generated from a variety of activities and waste generators across the Site, including the tritium facilities, separations, reactors, high-level waste tank farms, reactor materials, solid waste, and construction. Also, the Savannah River Site receives low-level waste from the Naval Reactors program and off-site generators for disposition.

Low-level waste is segregated into five categories to facilitate proper treatment, storage, and disposal. These categories are: 1) low-activity waste; 2) intermediate-level non-tritium waste; 3) intermediate-level tritium waste; 4) long-lived waste; and 5) suspect soil.

The low-level waste project will be managed with the overall goal of treatment and disposal such that there is no legacy stored waste and there is capability and capacity to cost effectively treat and/or dispose of newly generated wastes. This will be accomplished by identifying and either developing or contracting appropriate treatment and disposal technologies where present capabilities are not adequate.

- Continue storage operations for various low-level waste streams, utilizing on-site facilities.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide reduced level of treatment and disposal sufficient to maintain storage level at a constant level. No backlog will be processed.			
■ Continue operation of the waste sorting facility.			
■ Continue the design of new disposal units.			
SR-SW04	8,602	12,150	9,947

Metrics			
Low-Level Waste			
Treatment (m^3)	6,117.0	9,995.0	3,795.0
Storage (m^3)	18,040.0	14,854.0	14,525.0
On-site / Commercial Disposal (m^3)	2,371.0	9,576.0	3,235.0

SR-SW05 / Hazardous Waste Project

The hazardous waste project will involve: receipt from site generators, storage, and ultimate shipment off-site of newly generated hazardous wastes for treatment and disposal. Hazardous waste is currently stored on-site, and treated either off-site at a commercial facility or on-site at the Consolidated Incinerator Facility. All legacy hazardous waste will be shipped off-site for disposal, by the year 2002, and will result in a steady-state operation thereafter.

- Continue treatment, storage, and disposal of hazardous waste operations, utilizing on-site and off-site facilities.
- Continue implementation of the Hazardous Waste Off-site Shipment Release program.
- Continue reduction of legacy hazardous waste at a reduced level.
- Continue efforts to allow radioactive polychlorinated biphenyl waste to be shipped to Oak Ridge for treatment.

SR-SW05	5,468	4,901	3,971

Metrics			
Hazardous Waste			
On-site / Commercial Disposal (MT)	482.0	816.0	523.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
SR-SW06 / Sanitary Waste Project			
This project provides for the safe, environmentally sound sanitary waste disposal from the Savannah River Site, which produces approximately 25 tons of sanitary waste per day.			
Sanitary waste activities include receipt of newly generated waste, recycling, verification that the waste meets the commercial disposal facility waste acceptance criteria, radiological screening and contract administration. These activities are necessary to ensure compliance with the South Carolina Solid Waste Regulation R61-107.258 and DOE Order 5820.2A.			
Sanitary waste is currently being disposed at the regional Three Rivers Landfill located adjacent to the Savannah River Site. The Resource Conservation and Recovery Act closure activities at the on-site Interim Sanitary Landfill were completed in FY 1999 and normal sanitary waste operations are expected in FY 2000, which includes continued and increased operations for the "Green-Is-Clean" Shredder.			
■ Continue disposal of sanitary waste utilizing the regional Three Rivers Landfill.			
■ Dispose of approximately 25 tons per day of sanitary waste.			
SR-SW06	1,747	2,068	2,156

Metrics
No quantifiable corporate performance measures are associated with this project.

SR-SW07 / Pollution Prevention

Pollution prevention is the Savannah River Site preferred approach to reducing waste, mitigating health risks, and protecting the environment. Pollution prevention applied at the Savannah River Site can significantly reduce secondary wastes, allowing the cost savings to be used to accelerate the cleanup effort. As in industry, pollution prevention is a core program that helps the Savannah River Site achieve maximum environmental benefits.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Waste Minimization/Pollution Prevention Management program will provide the Savannah River Site the safe, effective, and environmentally responsible Waste Minimization Program strategy to implement specific waste reduction techniques based on current and projected information on waste generation, waste characterization, and ultimate waste disposal costs. ■ Continue site program management, including national and site reporting and monitoring. ■ Continue focus on contamination area rollback. ■ Develop and implement enhancements in chemical management, including pharmacy concept. ■ Continue second sort capabilities (SMARTS components). ■ Continue administering set aside fee program, including invoices, reporting support. ■ Implement sanitary waste processing at the Material Recovery Facility.			
SR-SW07	4,679	1,710	1,122
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Savannah River	710,155	733,031	824,864

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQNP-SI01-LT-SR / Security Investigations	
■ No significant change.	-4
SR-DO02 / WSI Landlord Project	
■ No significant change.	100
SR-DO03 / Savannah River Natural Resource Management and Research Institute	
■ Increase in FY 2000 funding provides for improved support of the natural resource management program.	659
SR-DO04 / Ecology Lab Project	
■ No significant change.	188
SR-DO05 / DOE External Program Support	
■ No significant change.	-5
SR-DO07 / DOE Program Support	
■ Decrease in FY 2000 reduces funding for grants and other Department of Energy mandated programs.	-3,715
SR-ER01 / Flood Plain Swamp Project	
■ Decrease in funding reduces number of vapor extraction units at TNX subprojects.	-2,370
SR-ER02 / Four Mile Branch Project	
■ Increase cost of operation at the F and H groundwater remediation facility and requirements for interim action at the mixed waste management facility.	10,239
SR-ER03 / Lower Three Runs and Operations Project	
■ Additional funds provide for assessment and remediation work on five subprojects designated in the Federal Facility Agreement.	6,466
SR-ER04 / Pen Branch Project	
■ Begin remedial action on the K-Area hazardous material unit 131-K subproject.	2,118

	FY 2000 vs FY 1999 ($000)
SR-ER05 / Steel Creek Project	
■ The decrease in funding reduces the field monitoring and assessment workscope. . .	-4,135
SR-ER06 / Upper Three Runs Project	
■ Several remediation subprojects were completed including the A/M Area Groundwater subproject; and the Savannah River Laboratory Seepage Basin subproject.	-4,236
SR-ER07 / Program Management	
■ Increased funding for environmental compliance support sub-activities at waste sites and groundwater remediation projects.	1,970
SR-FA02 / F-Canyon Deactivation Project	
■ No significant change.	15
SR-FA16 / F-Area Monitoring	
■ Reduced funding due to achieving a deactivated/minimum surveillance and maintenance condition for the Naval Fuels Facility (Building 247 and associated support facilities) with no additional deactivated facilities to be added until at least after the completion of F-Canyon/FB-Line nuclear materials stabilization activities in approximately FY 2003.	-294
SR-FA17 / H-Area Monitoring and Minor Facility Monitoring	
■ A new facility creates an increase in funding to cover surveillance and maintenance of the reactor heat exchange repair shop.	1,949
SR-FA18 / M-Area Monitoring Project	
■ Decrease reflects reduces support for deactivation activities.	-3,016
SR-FA19 / D-Area Monitoring Project	
■ Increase in funding provides for monitoring of the excess Heavy Water Production Facility.	1,261

	FY 2000 vs. FY 1999 ($000)
SR-FA20 / Reactors Monitoring Project	
■ Provides increased support for monitoring reactor facilities and operation of the C-Area Decontamination Facility, as well as initiation of preliminary deactivation planning.	3,485
SR-HL01 / H-Tank Farm	
■ Decrease reflects the completion of RHLWE in FY 1999 and re-allocation of labor charges to F-Tank Farm for labor and activities that should have been in the F-Tank Farm project baseline summary.	-3,665
SR-HL02 / F-Tank Farm	
■ In FY 1999 F-Tank Farm labor incorrectly assigned to H-Tank Farm; corrected in FY 2000.	3,258
SR-HL03 / Waste Removal Operations and Tank Closure	
■ Tank closure design efforts are reduced concurrent with the slow down of waste removal activities.	-1,156
SR-HL04 / ITP/ESP/LW Operations	
■ Additional surveillance and maintenance activities (including design and engineering) for the In-Tank Precipitation and Late Wash facilities.	10,072
SR-HL05 / Vitrification	
■ Canister production is reduced from 200 canisters to 100 canisters.	-5,345
SR-HL06 / Glass Waste Storage	
■ Fewer canisters will be placed in storage and critical maintenance activities are reduced to minimum safe levels.	-231
SR-HL07 / Effluent Treatment Facility	
■ Funds additional maintenance activities at the Effluent Treatment Facility/Consolidated Incinerator Facility.	1,041

	FY 2000 vs. FY 1999 ($000)
SR-HL08 / Saltstone	
■ Saltstone operations in standby condition awaiting high-level waste salt alternative decision. Will process a minimal amount of waste from the Effluent Treatment Facility.	120
SR-HL12 / High-Level Waste Removal	
■ Decreased funding reflects stretch-out of the construction schedule to balance all priorities within the High-Level Waste Program.	-8,441
SR-HL13 / Salt Disposition	
■ Increase in funding provides for design and construction of pilot/prototype facility.	29,146
SR-IN11 / Infrastructure Line-Item	
■ Decrease reflects reduced support for future infrastructure construction line-item project planning.	-1,074
SR-IN12 / Operating Projects	
■ Increase funding required because of unavailability of prior year funds to support DOE Federal employees onsite. Support increased requirements for critical regulatory capital projects deferred from prior years.	14,447
SR-SF01-LT / K-Area Spent Nuclear Fuel Project (Post 2006)	
■ Increase, in part, due to transfer of the project from the Site/Project Completion account due to longer term mission of storing Rocky Flats plutonium. Also, increase supports first year of receipts from Rocky Flats.	33,410
SR-SF02 / L-Reactor Spent Nuclear Fuel Project	
■ Increase in funding due to shipping Mark 16 and 22 fuel to the canyons.	4,361
SR-SF03 / RBOF Spent Nuclear Fuel Project	
■ Decrease reflects reduction in one shift of basin operators based on transfer of fuel receipts to the L-Reactor.	-6,433
SR-SF04-LT / Heavy Water - D-Area (Post 2006)	
■ Increase reflects the transfer of the project from the Site/Project Completion account due to potential sale of heavy water and long-term storage of heavy water.	4,984

	FY 2000 vs. FY 1999 ($000)
SR-SF09 / Spent Nuclear Fuel Treatment and Storage Project	
■ Funding will support initiation of a design only line-item construction project for detailed of the Spent Nuclear Fuel Treatment and Storage Facility.	10,045
SR-SW01 / Consolidated Incinerator Facility	
■ Funding increase supports processing of solvent waste.	2,790
SR-SW02 / Transuranic Waste Project	
■ Operations to provide safe storage, minimal treatment and certification activities associated with sending shipments to the Waste Isolation Pilot Plant.	-3,389
SR-SW03 / Mixed Low-Level Waste Project	
■ Funding increase due to termination of waste chargeback demonstration and continued support for completion of the Mixed Waste Facility Upgrade Project.	851
SR-SW04 / Low-Level Waste Project	
■ Decrease reflects reduced treatment and disposal activities for legacy waste volumes.	-2,203
SR-SW05 / Hazardous Waste Project	
■ Decrease reflects reduced disposal activities.	-930
SR-SW06 / Sanitary Waste Project	
■ Increase supports continued operation of the "Green-Is-Clean" shredder.	88
SR-SW07 / Pollution Prevention	
■ Decrease reflects postponement of high return-on-investment projects.	-588
Total Funding Changes, Savannah River	91,833

Major Issues

- The production output from the Defense Waste Processing Facility will be restricted to 100 canisters in FY 2000 (and FY 2001) attributable to reduced availability of feed materials from the High-Level Waste tanks due to a slow down in waste removal activities. This slow down in waste removal activities is due to two major reasons: first, a redirection of funding away from waste removal (SR-HL12) to provide additional funding for the salt alternatives (SR-HL13), and the need to slow down the can production rate to allow match up between the sludge feed stream and salt feed stream to minimize lifecycle canister production.

Multi-Site

Mission Supporting Goals and Objectives

Mission

The mission of the Defense Environmental Management Post 2006 Completion account carried out by the Multi-Site programs includes funding to provide leadership and support, establish and implement National and Departmental policy, conduct analyses and integrate activities across a number of sites. The majority of the funds requested in the Multi-Site activities defense account are required for the Federal contribution to the Uranium Enrichment Decontamination and Decommissioning Fund (83 percent). Other Multi-Site activities budget efforts consist of Headquarters technical support activities, Environmental and Regulatory Analysis activities, Transportation and Packaging functions, Emergency Preparedness activities, National Analytical Management Program activities, and Pollution Prevention program functions

This activity also includes the required Federal Government deposit to the Uranium Enrichment Decontamination and Decommissioning Fund The Energy Policy Act of 1992 authorizes annual deposits into the Uranium Enrichment Decontamination and Decommissioning Fund of up to $480,000,000 annually adjusted for inflation. Domestic utilities are to be assessed up to $150,000,000 per year (adjusted for inflation) for 15 years based on their purchase of Department-produced separative work units. The remainder of the annual deposit, currently estimated at $420,000,000 (in FY 2000) was authorized to come from annual appropriations.

Program Goal

The goals of the Multi-Site activities will allow the Environmental Management (EM) to better coordinate EM-wide and the Department of Energy (DOE)-wide program efforts and avoid overlaps and inconsistencies.

The main goal of EM's Tribal program, within the Policy and Management Program, is to fully implement DOE's American Indian Policy. The EM maintains cooperative agreements with ten Tribal nations in order to enhance their direct involvement in clean decisions and activities. The cooperative agreements build core scientific and technical capacity at the Tribal level and allow for the establishment of Tribal environmental program offices. As a practical matter, the cooperative agreements enhance the government-to-government relationship between the Department and Tribal nations, which is the cornerstone of the Department's American Indian Policy. In order to fulfill EM's goal, the program seeks to maintain and, in some instances, increase funding for the cooperative agreements with Tribal nations directly affected by EM's cleanup activities.

The main goal of EM's Office of Intergovernmental and Public Accountability, within the Policy and Management program, is to promote active public involvement in the EM planning and decision-making processes. Specifically, the mission of the office is to provide State, Tribal, and local governments and other interested stakeholders with opportunities for meaningful involvement in managing the cleanup and closure of the Nation's former nuclear weapons complex.

The principal means by which this goal is accomplished are through the EM Site-Specific Advisory board and through grants and cooperative agreements with the National Governors' Association, the National Association of Attorneys General, and the National Conference of State Legislatures.

The National Transportation Program develops and maintains DOE's baseline transportation resources, including policy, to assure the availability of safe, regulatory compliant, economical, efficient, and timely transportation for DOE materials, including radioactive and other hazardous materials and wastes. Goals for achieving an integrated program mission include: achieving a forward-looking, system-wide assessment of the Department's transportation and packaging needs; assuring safe, environmentally compliant, and cost effective transportation management system and operations; performing as a service center for transportation campaigns across the Department's complex; focusing expertise from the Department's transportation and packaging technical base program to solve transportation and packaging requirements needs; and enhancing transportation relationships and coordinating transportation communication throughout the Department.

The goal of EM's Emergency Management Program is to assist the National Fire Protection Association in the development of a national standard for training requirements for radioactive materials for hazardous materials teams and emergency medical staff. In coordination with the Office of Emergency Management (NN-60), this program will coordinate field reviews of EM facilities to assure compliance with DOE Order 151.1 and their preparedness and readiness to address emergencies.

Full implementation of the Transportation Emergency Preparedness Program at the eight DOE Regional Coordinating Offices will begin under the Emergency Preparedness Program.

The mission of the National Analytical Management Program is to insure that the analyses performed by the analytical laboratories within the EM Complex are of sufficient quality to: meet the needs and requirements of the EM and the regulatory community; to be scientifically and legally defensible; to provide the basis for returning the DOE environment to the public domain; and to assist in meeting the objectives of the *Accelerating Cleanup: Paths to Closure* plan. To support this mission, the following goals have been established:

- Establishment of an Analytical Laboratory Accreditation Program for all laboratories doing business with the DOE/EM;
- Increase data reliability and defensibility by implementing a program to provide traceability for all Reference Laboratories to the National Institute of Standards and Technology;
- Increase the quality and reliability of the analytical data by implementing a common electronic reporting format;
- Establishment of a comprehensive informational database to identify baseline information for the EM analytical services; and

- Decrease costs for analytical services by sharing laboratory audit information.

The National Pollution Prevention Program funds Departmental Headquarters and field activities. The missions of the Pollution Prevention Program are to: 1) comply with waste minimization, pollution prevention, affirmative procurement, and recycling requirements under Federal/state statutes, Executive Orders, and DOE Orders; and 2) reduce waste generated through implementation of cost effective pollution prevention projects.

These funds will allow the Department to meet the Secretary of Energy's pollution prevention goals to be achieved by December 31, 1999, as stated below:

- Reduce by 50 percent the generation of radioactive waste
- Reduce by 50 percent the generation of hazardous waste
- Reduce by 50 percent the generation of low-level mixed waste
- Reduce by 33 percent the generation of sanitary waste
- Recycle 33 percent of sanitary waste from all operations
- Increase procurement of Environmental Protection Agency designated recycled products to 100 percent, except where they are not commercially available at a reasonable price or do not meet performance standards

The Department of Energy achieved the 50 percent reduction goals for radioactive, hazardous, and low-level mixed waste from routine operations at the end of FY 1997 In addition, the Department met the recycling goals of 33 percent in 1997. Additional effort will be required to meet the affirmative procurement goals. The Department has established an additional goal to reduce wastes from cleanup and stabilization activities by 10 percent annually, beginning in FY 1999 and will strive to further reduce its waste through continuous improvement in future years.

The White House plans to consolidate, streamline, and tighten the existing Executive Orders and policy memoranda into four new Executive Orders. The first of these new Orders, Executive Order 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition, was issued on September 16, 1998. Executive Order 13101 contains requirements in previous Orders and new requirements to reflect the President's environmental agenda. The other Executive Orders are expected before summer.

Program Objectives

The Multi-Site activities focus National attention on several areas that impact the Environmental Management goals and planned efforts which cut across the Department of Energy complex.

Performance Measures

There are no Performance Measures associated with the Multi-Site activities.

Significant Accomplishments and Program Shifts

Policy and Management

- Improve analytical capabilities for and conduct comparative life-cycle analyses for EM programs and projects (FY 1998/FY 1999/FY 2000).
- Provide general analytic and production support to national environmental policy development (FY 1998/FY 1999/FY 2000).
- Continue providing for EM-wide information management infrastructure activities and provide for hardware, software, maintenance, and upgrades to support management information systems (FY 1998/FY 1999/FY 2000).
- Continue to maintain and develop EM's government-to-government relationship with ten tribes designed to foster cooperation on waste shipment and environmental restoration efforts (FY 1998/FY 1999/FY 2000).
- Continue to implement training and education programs to resolve the Defense Nuclear Facilities Safety Board Recommendation 93-3 (FY 1998/FY 1999/FY 2000).

Complex-Wide Waste Management Support and Analyses

- Issue the Waste Management Programmatic Environmental Impact Statement Records of Decision for Transuranic Waste Storage and Treatment and Hazardous Waste Treatment; continue to work with sites and external stakeholders to resolve issues related to the configuration of the waste management system and to support issuance of Records of Decision for high-level waste storage and low-level waste and mixed low-level waste treatment and disposal based upon the Waste Management Programmatic Environmental Impact Statement (FY 1998/FY 1999/FY 2000).
- Develop and refine disposition maps to show the planned pathways to move waste or materials from inventory or generation through required processing to treatment or stabilization and on to final disposition; conducted integrated planning efforts to identify and evaluate opportunities to reduce risk and long-term mortgages associated with treatment and disposal of backlog waste (FY 1998/FY 1999/FY 2000).
- Issue and continue support to implement DOE Order 435.1, Radioactive Waste Management (FY 1998/FY 1999/FY 2000).
- Review and approve Performance Assessments and Composite Analyses as required by the Defense Nuclear Facilities Safety Board Recommendation 94-2 (performance assessments of low-level radioactive waste disposal) for Los Alamos National Laboratory, Savannah River's saltstone and E-Area vaults, Hanford, Idaho National Engineering and Environmental Laboratory and issued Disposal Authorization Statements (FY 1998/FY 1999/FY 2000).

- Reimburse Environmental Protection Agency for Resource Conservation and Recovery Act inspections of DOE facilities as required by Section 104 of the Federal Facility Compliance Act of 1992 (FY 1998/FY 1999/FY 2000).
- Complete the technical assessment by the National Academy of Science's Board on Radioactive Waste Management of the treatment options for high-level radioactive waste stored at the Idaho National Engineering and Environmental Laboratory (FY 1998/FY 1999/FY 2000).
- Provide technical support for EM/Office of Civilian Radioactive Waste Management high-level waste activities, including implementation of the Environmental Management/Radioactive Waste Memorandum of Agreement and preparation of the Yucca Mountain Environmental Impact Statement (FY 1998/FY 1999/FY 2000); completed EM funded activities on testing high-level waste glass forms (FY 1998).

Technical Support to Environmental Restoration

- Provide technical support for EM/environmental restoration initiatives, including project and project baseline review and analysis efforts (FY 1998/FY 1999/FY 2000).
- Provide for the Federal Contribution to the Uranium Enrichment Decontamination and Decommissioning Fund as required by the Energy Policy Act of 1992 (FY 1998/FY 1999/FY 2000).

Support to Transition Activities

- Continue to support Headquarters directed nuclear material field activities to achieve cost efficiencies and increase the effectiveness of these activities for accelerating stabilization and deactivation opportunities (FY 1998/FY 1999/FY 2000).

Headquarters Program Integration

- Continue to support the *Paths to Closure* activities (FY 1998/FY 1999/FY 2000).
- Continue Hazardous Waste Operations and Emergency Response training at the DOE weapons facilities and related sites (FY 1998/FY 1999/FY 2000).

Environmental and Regulatory Analysis

- Conduct pilot projects at the DOE sites to demonstrate and evaluate the viability of utilizing the LandTech technology as a community based collaborative decision-making tool to achieve tangible solutions for site cleanup, site closure, and land title transfer of Federal properties to public interests (FY 1998/FY 1999/FY 2000).
- Sign an agreement with the DOE, the State of New Mexico, and the Environmental Protection Agency Region VI that describes a mutual Albuquerque site vision, promotes collaborative decision-making as the basis for a strong and effective working relationship at Albuquerque sites, and clarifies the applicability of an existing Albuquerque interagency agreement and unilateral order (FY 1998/FY 1999/FY 2000).
- Establish a collaborative decision-making process at the Albuquerque Operations Office, that results in a reduction in the number of Notices of Violation received by the Department by 50 percent from

the number received in FY 1998, and a decrease in the time for the State of New Mexico to approve the DOE's submitted documents by 25 percent (FY 1998/FY 1999/FY 2000).

Transportation and Packaging

- Initiate Systems Engineering for EM transportation activities. This includes collecting requirements for current transportation activities, identification of new transportation and packaging needs to include analysis of complex-wide material flows, sensitivity analysis of packaging types and development and assessment for major transportation implementation options (FY 1998).
- Develop and maintain partnership with the Department of Transportation to perform safety assessments on Department of Energy motor carriers (FY 1998/FY 1999/FY 2000); continue the analyses of potential packaging materials to improve the future packaging designs in safety performance (FY 1998); enhance the existing safety assessment program to include low-level waste container and package systems (FY 1999); and improve the existing package and transportation safety reporting program to emphasize safety performance (FY 1999).
- Maintain and revise the training for HAZMAT shipments to assure compliance with 49 U.S.C. 5101 (FY 1998); maintain the Explosives Classification program to ensure DOE movement of explosives are in compliance (FY 1998); and maintain an efficient regulatory compliance training program (FY 1999/FY 2000).
- Implement a complex-wide system to ensure internal and external notification of high visibility shipments to appropriate stakeholder officials, and provide public awareness of unclassified shipments (FY 1998/FY 1999/FY 2000); continue transportation focused forums and communications, with internal program activities and external stakeholders, to identify and resolve transportation issues and participate in specific transportation shipment planning (FY 1998/FY 1999/FY 2000); establish DOE wide protocols for notification, planning, inspection, and other functions with states and tribal governments (FY 1999/FY 2000); and provide technical support to field and program offices and to state, tribal, and local governments in preparing for and executing hazardous materials shipping campaigns (FY 1998/FY 1999/FY 2000).
- Maintain DOE's automated transportation systems in support of efficient shipping and tracking throughout the DOE complex (FY 1998/FY 1999/FY 2000). These systems include the DOE tracking system, the real-time and historical shipment database, and the hazardous materials routing system.
- Maintain DOE's transportation and packaging technical base program to establish DOE's position on regulatory issues related to transportation and packaging, and to provide transportation and packaging testing and materials infrastructure for DOE (FY 1999/FY 2000).
- Complete formulation of the policy for the Transportation Emergency Preparedness Program (FY 1999).
- Conduct a full field transportation exercise, TEMPER '98, in Montgomery County, Maryland. The exercise integrates the planning, training, and conduct of an exercise and establishes a cohesive agency implementation of the support requirements (FY 1998/FY 1999).

- Implement an integrated, inter-regional Transportation Emergency Preparedness program through the eight DOE Regional Coordinating Offices to address State, Tribal, and local officials concerns about DOE's transportation of radioactive materials (FY 1998/FY 1999/FY 2000).

Emergency Management

- Base on recent emergencies at EM facilities, initiated a more focused Facility Emergency Preparedness Program to review site/facility plans and procedures to assure compliance with DOE Orders (FY 1998/FY 1999/FY 2000).

National Analytical Management Program

- Develop guidelines that will allow reference laboratories to establish a direct link to the national standard (National Institute of Science and Technology) in analytical measurement processes and the preparation of secondary standards. The guidelines delineate the process of establishing a reference or secondary laboratory according to requirements established by the American National Standards Institute (FY 1998/FY 1999/FY 2000).
- Provide leadership by the National Analytical Management Program for the DOE Office of Environmental Restoration to become an accrediting body within the Environmental Protection Agency's National Environmental Laboratory Accreditation Program (FY 1998/FY 1999/FY 2000).

Pollution Prevention

- Maintain pollution prevention infrastructure at DOE sites and operations/field offices to encourage efficiency and environmental stewardship through implementation of projects that reduce waste/pollutant and reduce life-cycle cost of operations (FY 1998/FY 1999/FY 2000).
- Conduct reporting, tracking, and waste minimization program activities required by the Resource Conservation and Recovery Act at DOE sites that generate, treat, or store hazardous/mixed wastes (FY 1998/FY 1999/FY 2000).
- Conduct pollution prevention activities required by State agencies at DOE sites (FY 1998/FY 1999/FY 2000).
- Provide leadership to the Department's pollution prevention program through development of policy/goals and as chair for the Multi-Site Waste Reduction Steering Committee and the field Waste Minimization Coordinators Group (FY 1998/FY 1999/FY 2000).
- Coordinate pollution prevention activities across the complex and work with White House and other Federal agencies in developing and implementing Pollution Prevention Executive Orders (FY 1998/FY 1999).
- For FY 2000, the Department will change the way the Pollution Prevention program is managed. Funds for the Headquarters controlled National Pollution Prevention Program will be significantly reduced from FY 1999 level. The field is expected to provide the resources required to continue implementing high return-on-investment and cost-effective projects and complying with Executive Order and DOE Orders.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQ-PM-001 / Policy and Management	19,738	27,533	23,190	-4,343	-15.8%
HQ-WM001 / Complex-Wide Waste Management Support and Analyses	14,851	2,728	2,610	-118	-4.3%
HQ-100-AA / Technical Support to ER	8,672	720	690	-30	-4.2%
HQ6002 / Support to Transition Activities	5,823	2,735	3,617	882	32.2%
HQNP-NCSP/Nuclear Criticality Safety Program	0	3,000	3,750	750	25.0%
HQ-EM74 / Headquarters Program Integration	9,182	8,108	9,081	973	12.0%
HQ-EM75 / Environmental and Reg. Analysis	1,501	518	300	-218	-42.1%
HQ-TMHQ1 / Transportation and Packaging	10,509	11,918	11,753	-165	-1.4%
HQ-EM-HQ-001 / Emergency Preparedness Program	3,259	3,218	2,849	-369	-11.5%
ID-CMP-001 / National Analytical Management Program	5,205	3,000	3,000	0	0.0%
OPS/HQ-PP / Pollution Prevention	23,575	12,790	7,138	-5,652	-44.2%
Subtotal	102,315	76,268	67,978	-8,290	-10.9%
HQ-9999-01 / Federal Contribution to UE D&D Account	388,000	398,088	420,000	21,912	5.5%
Total, Multi-Site Activities	490,315	474,356	487,978	13,622	2.9%

Site Description

Multi-Site

The Multi-Site program consists of several subprograms, which provide technical support, education and training, Hazardous Waste Operations and Emergency Response Grants, Environmental and Regulatory Analysis, Transportation Management, National Analytical Management, Emergency Preparedness and Pollution Prevention.

The role of the Multi-Site Federal effort is to provide leadership and support, establish and implement National and Departmental policy, conduct analyses and integrate activities across sites. The Multi-Site program also supports education and training to improve the technical capability of the EM staff pursuant to the Defense Nuclear Facilities Safety Board Recommendation 93-3, "Improving the Technical Capabilities in Defense Nuclear Facility Programs". This program also provides for technical assistance in assessing and establishing site baselines through data collection and analysis, all of which support the accelerated closure of EM sites. The Multi-Site program assesses the progress of the EM sites in order to track and report to Congress, interested stakeholders, and the public on the status of the program. Also, funds are provided for the EM Multi-Site support grants for the Hazardous Waste Operations and Emergency Response training

The Environmental and Regulatory Analysis program advocates and champions the resolution of environmental, legal, regulatory and contractor work force restructuring issues that cut across many sites and do not readily fall within the purview of the primary business lines. The program provides policy direction and guidance to operations and the Environmental Management program offices to successfully implement the negotiation and enhancement of environmental compliance and cleanup agreements and the requirements of the National Environmental Policy Act. The program also promotes conflict resolution and collaborative decision-making that will facilitate partnering programs between DOE and its regulators, and its stakeholders.

The National Transportation program provides policy, guidance, and a transportation infrastructure to ensure the availability of safe, efficient, compliant, and timely transport of all DOE materials (except weapons, weapons components, and Navy spent fuel). The program serves as the corporate point of contact and management for interface and exchange by DOE with external entities, other Federal agencies, consensus standards organizations and transportation regulators. The program's near-term focus is on transportation and packaging needs in support of the DOE/EM's focus on *Accelerating Cleanup: Paths to Closure* plan.

The DOE Order 151.1, "Comprehensive Emergency Management System", requires the Office of Environmental Management to ensure the implementation of policy and DOE Order requirements related to emergency management facilities/sites and operations offices under its cognizance. It is also required to establish and maintain a system for handling emergency occurrences involving unclassified shipments of radioactive materials. The Emergency Management Program implements the Transportation Emergency Preparedness Program and the Facility Emergency Preparedness Program to address these requirements.

The National Analytical Management Program, operated out of the Idaho Operations Office, is responsible for the management for the following areas: Quality Assurance, Resource Management, Data Integration, Data Validation, and Methods Development. Quality Assurance includes the production of defensible, reliable data through the evaluation of the performance of laboratories that provide sample analysis services to the Department. The National Analytical Management Program represents DOE on the National Environmental Laboratory Accreditation Council and sponsors the Multi-Agency Radiation Laboratory Protocol group. Resource management includes the sample management, information systems, and laboratory issues for which technical assistance, policy and guidance are provided. The Data Integration activity supports the use and development of analytical planning tools to improve the selection and documentation of environmental management program decisions. Projects within the Methods Development Program includes the maintenance of the methods compendium and database, methods validation, and business practices including acquisition strategy.

The National Pollution Prevention program funds Headquarters and field activities for the Department's Pollution Prevention program. The missions of the Department's Pollution Prevention program are to: 1) to comply with waste minimization, pollution prevention, affirmative procurement, and recycling requirements under federal/state statues, Executive Orders, and DOE Orders, and 2) reduce waste streams generated through implementation of cost effective pollution prevention projects. The National Pollution Prevention program funds will be used primarily by the field to comply with federal/state regulations on waste minimization and pollution prevention. A small fraction of the funds will be used by Headquarters to coordinate the Department's overall Pollution Prevention program, develop guidance/policy, provide technical support, facilitate information transfer, conduct program reviews, compile performance data and prepare reports that are required by Executive Orders and the 1998 Programmatic Environmental Impact Statement Lawsuit Settlement between DOE and the Natural Resources Defense Council. For FY 2000, the field will be responsible for implementing many of the activities funded by the National Pollution Prevention program in prior years. Such activities include complying with Executive Orders and DOE Orders, training and providing technical support to waste generators in identifying opportunities, implementing high return-on-investment and cost-effective projects, tracking pollution prevention progress and reporting progress to Headquarters. The National Pollution Prevention program is responsible for the Department's significant progress toward meeting its waste reduction goals. These goals are included in the Department's *Accelerating Cleanup: Paths to Closure* plan.

Pollution prevention is required by Federal and State statutes including the Pollution Prevention Act; Resource Conservation and Recovery Act; Emergency Planning and Community Right-to-Know Act; and Executive Orders 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements and 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the Mult-Site activities as outlined in the *Accelerating Cleanup: Paths to Closure* plan. The funds requested for FY 2000 are appropriate to perform the activities based on a historical level of effort cost. No quantifiable corporate performance measures are associated with these projects.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

HQ-PM-001 / Policy and Management

This activity provides the other contractual services funding required to plan, direct, and manage the EM program. Program activities encompass the Administrative Support area including support for the Assistant Secretary's staff; other contractual services necessary to accomplish program activities that include overall management; acquisition of education and training activities for the entire EM program; and environmental policy recommendations and planning activities.

- Focus on re-engineering the EM information infrastructure, strengthening its technical support and enhancing its systems development capability to provide a more robust, efficient, and cost-effective network and services. This will enable EM to support a growing number of applications, greater volume of transactions, and more sophisticated users. Planned activities include the EM Network Services, EM Customer Support, System and Data Security and Integrity, and EM Systems Development.
- Enhance Tribal, State, and local government participation in the EM program through the continuation of State and Tribal Governments Working Groups, government-to-government relationships with Native American Tribes, and cooperative agreements with the National Governors Association, and the National Association of Attorneys General; continue management and evaluation of the EM Site Specific Advisory Board initiative and support the National Environmental Training Office's complex wide efforts.
- Plan activities to include standardizing environmental crosscutting training, expanding partnerships with other Federal and State agencies, conducting training effectiveness evaluations, and responding to General Accounting Office/Inspector General/Defense Nuclear Facilities Safety Board recommendations. Support EM's participation in the Science Bowl.
- Provide analytical support for life-cycle analysis for the EM program and projects. Provide general analytical and production support for National EM policy including long-term stewardship strategy, and completion of geographic information system development.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ As part of a Departmental and Natural Resources Defense Council settlement agreement, funding is included for a Citizens Monitoring and Technical Assessment Fund for eligible external organizations to acquire contractor support that will allow them to perform technical reviews and analyses of environmental activities at the DOE sites. A nationally recognized, non-profit, non-governmental organization will be jointly selected to administer this fund. Any non-profit, non-governmental organization or any Federally recognized tribal government working on issues related to the nuclear weapons complex is eligible to receive monies from the Fund, upon application and subject to the criteria set forth. Any organization or tribe receiving funds for technical review and analysis will provide copies of all final work products to DOE and the Fund Administrator and any field products may be made publicly available.			
HQ-PM-001	19,738	27,533	23,190

HQ-WM001 / Complex-Wide Waste Management Support and Analyses

The mission of the waste management program is to protect people and the environment from the hazards of the DOE radioactive and hazardous waste by providing an effective and efficient system that minimizes, treats, and stores the waste and disposes most of the waste as soon as possible. The project provides support for waste management activities that cut across the entire DOE complex. Support is provided for interactions with the Environmental Protection Agency, the Nuclear Regulatory Commission, and the Defense Nuclear Facilities Safety Board on waste management issues; implementation of the DOE requirements for managing radioactive wastes; and technical analyses to evaluate complex-wide integration opportunities and reduce outyear costs.

- Provide technical analysis to enable efficient implementation of DOE Order 435.1, Radioactive Waste Management; DOE Policy 450.5, Line Environment, Safety and Health Oversight; and related interactions with the Nuclear Regulatory Commission and the Environmental Protection Agency.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conduct analyses and reviews in response to the Defense Nuclear Facilities Safety Board recommendations, including reviews of revised Site Performance Assessments for disposal of low-level radioactive waste in accordance with the Board's Recommendation 94-2.			
■ Provide support for privatization initiatives including feasibility analyses, lessons learned, and interactive workshops among field personnel.			
■ Reimburse the Environmental Protection Agency for cost of annual Resource Conservation and Recovery Act inspections at the DOE facilities that store, treat, or dispose of mixed low-level radioactive waste			
■ Meet the requirements of the Memorandum of Agreement with the Office of Civilian Radioactive Waste Management for acceptance of the Department's high-level radioactive waste.			
■ Conduct technical analysis of major waste management program issues by the National Academy of Science's Board on Radioactive Waste Management.			
■ Identify and analyze opportunities to integrate waste management activities across the DOE complex.			
■ Exchange and analyze information with foreign national programs on innovative waste management technologies and operational experiences.			
HQ-WM001	14,851	2,728	2,610
HQ-100-AA / Technical Support to ER			
The activities funded by this project include a variety of crosscutting efforts that support required Environmental Restoration and EM initiatives. Technical support is provided in the areas of performance measure tracking; information/data management integration; and project review/analysis.			
■ Continue to provide technical support in the areas of document review, program integration, and other crosscutting EM activities.			
HQ-100-AA	8,672	720	690

(dollars in thousands)

FY 1998	FY 1999	FY 2000

HQ6002 / Support to Transition Activities

This activity provides funding to continue initiatives to support and respond to the concerns of the Defense Nuclear Facilities Safety Board; Environmental Protection Agency; Nuclear Regulatory Commission; other technical review boards; and contractor proposed stabilization and deactivation projects. This support consists of individuals who are knowledgeable and experienced with the Nuclear Material and Facility Stabilization program. These individuals are able to perform independent technical reviews of scientific base and engineering practices.

- Will accelerate stabilization and deactivation activities to respond to concerns of the Defense Nuclear Facilities Safety Board, Environmental Protection Agency, Nuclear Regulatory Commission, and other technical review boards.
- Provide support for acceleration of plutonium shipments between Rocky Flats, Richland, and the Savannah River Site.
- Provide support of the material stewardship program that will reduce the outyear mortgage and facilitate material dispositioning through consolidation of selected excess nuclear material.
- Continue to support grants and agreements to States for spent nuclear fuel shipments to Idaho from the West Coast and cross country.
- Continue to support the Interagency Agreement with the Nuclear Regulatory Commission on spent nuclear fuel issues; and provide support to DOE, the Department of State, and Indonesian Governmental organizations to complete the Indonesian spent fuel shipment.
- Continue funding and fulfill a 4-year agreement ending in FY 2000 with Pembroke State University for motivational activities and counseling to Native American and African American students in the area of environmental science.
- Continue payment of International Atomic Energy Agency/Computer Education Group dues to support international commitments on spent nuclear fuel and nuclear material management technology exchange.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue support of the International Institute for Applied Systems Analysis to perform research and impact of nuclear contamination in the former Soviet Union to present viable alternatives in addressing critical remediation concerns.			
■ Continue to fund the Arctic Military Environmental Corporation program to support a Department of Defense led effort to improve the Russian Navy's radioactive waste management capabilities associated with the nuclear submarine decommissioning program. The Arctic Military Environmental Corporation is a forum for dialogue and joint activities among the United States, Russian, and Norwegian military and environmental officials.			
HQ6002	5,823	2,735	3,617

HQNP-NCSP / Nuclear Criticality Safety Program

This activity provides support to the Nuclear Criticality Safety Program. The Implementation Plan for Recommendation 93-2, "The Need for Critical Experiment Capability," established a program to maintain the viability of the Department's critical experiments program and improve the knowledge base underlying prediction of criticality. This resulted in the five-element Nuclear Criticality Predictability Program. Ongoing activities have been included under the program established for the Defense Nuclear Facilities Safety Board Recommendation 97-2, which supports the efficient integration and functioning of criticality safety programs across all the DOE operations involving fissile materials. The Environmental Management-funded segments of the Defense Nuclear Facilities Safety Board Recommendation 97-2, Nuclear Criticality Safety Program, consist of three elements: a) nuclear data; b) calculational methods; and c) guidance on applicability of bounding curves/data.

- Nuclear Data
  - Perform neutron reaction cross section measurements for Potassium (K) and Flourine (F) and one other isotope, as needed.
  - Generate aluminum, U-233, U-235, and Chlorine covariance data in new Evaluated Nuclear Data File formats.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ Update other Evaluated Nuclear Data File/Part B with relevant covariance information, a technical component of such files.			
▸ Develop the Oak Ridge National Laboratory Evaluated Nuclear Data File Processing module for a group-energy Monte Carlo computer code for an unresolved resonance level treatment.			
▸ Develop a nuclear data file processing module capability to process covariance.			
▸ Update the Cross-Section Evaluation Working Group benchmarks for criticality applications.			
▸ Continue the Cross-Section Evaluation Working Group participation and criticality integration.			
■ Analytic Methods			
▸ Continue work on the group-energy Monte Carlo computer code KENO, the continuous energy Monte Carlo Nuclear Particle computer code MCNP, and the continuous energy Monte Carlo computer code VIM.			
▸ Place new versions of the methods in the Radiation Safety Information Computational Center and continue top priority modification.			
▸ Conduct workshops on the systems for criticality safety analysis.			
▸ Complete work on stratified sampling.			
■ Guidance/Bounding Curves			
▸ Apply sensitivity/uncertainty methods to additional specific DOE fissile material operations and to simulate intermediate-energy range critical experiments.			
▸ Report on sensitivity/uncertainty methods results for the first set of bounding curves and data; and statistical methods for defining bounding margins of subcriticality.			
▸ Report on results for minimum critical parameters.			
▸ Document the standardized computer analysis for licensing evaluation system optimization sequence and release it to the Radiation Safety Information Computational Center for distribution.			
HQNP-NCSP	0	3,000	3,750

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

HQ-EM74 / Headquarters Program Integration

The activities funded in this Project Baseline Summary provide training at DOE nuclear weapons facilities and related sites under the Hazardous Waste Operations Emergency Response program. Funding also is provided for technical support in the areas of document review, program integration, *Accelerating Cleanup: Paths to Closure* plan initiative and other crosscutting activities.

- Continue the training at DOE nuclear weapons facilities and related sites under the Hazardous Waste Operations Emergency Response program.
- Accelerate site closure goals by enhancing *Paths to Closure* initiatives: identify opportunities for mortgage reduction; accelerate project efficiencies through "lessons learned" and "learning-curve" implementation; and maintain site closure goals by monitoring site critical paths and baselines.

HQ-EM74	9,182	8,108	9,081

HQ-EM75 / Environmental and Regulatory Analysis

The activities funded by this project functions as a team to promote cost efficiencies within the EM program by establishing effective lines of communication with programs and sites to identify and assist in resolving multi-site environmental and regulatory issues across the DOE complex. Acts as the National Environmental Policy Act Compliance Officer to promote cost effective compliance across the EM program.

- Establish and complete a collaborative decision-making process at Albuquerque and at least one additional DOE site to build trust and confidence between DOE and its State and the Environmental Protection Agency regulators and to assist in accelerating the closure of the site.
- Continue and complete LandTech implementation at the Idaho National Engineering and Environmental Laboratory and at the Grand Junction Project Office, that will provide a systematic, Internet-based approach for stakeholder and regulatory integration and decision-making during all phases of managing a site closure project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conduct analyses and reviews of the National Environmental Policy Act and Agreement-in-Principle documentation.			
HQ-EM75	1,501	518	300

HQ-TMHQ1 / Transportation and Packaging

The National Transportation program develops and maintains the DOE baseline transportation resources, including policy to assure the availability of safe, regulatory compliant, economical, efficient and timely transportation for DOE materials through: 1) the identification of transport needs of all the DOE programs, particularly in supporting EM focus on project acceleration and site closure; 2) resolution of transport issues at the program level; 3) maintenance of a corporate institutional program to interact with national and regional stakeholders; 4) vigorous examination of all projected DOE material flow; 5) conducting a forward-looking, aggressive transportation technology program to resolve complex transportation and packaging problems and address regulatory issues; and 6) operational management of all packaging and shipping activities both on- and off-site (excluding weapons and weapon components).

The Department's transportation and packaging activities are one of the most heavily regulated functions because of the hazardous materials (particularly radioactive) that are shipped. Noncompliance with regulations carries heavy penalties (both criminal and civil). Transportation is an area of public scrutiny due to the perceived hazards associated with the transportation of the DOE materials.

- Assure a safe and regulatory compliant transportation system and operations.
- Focus on implementation of baseline transportation and packaging requirements to support EM's *Accelerating Cleanup: Paths to Closure* plan, and apply transportation systems engineering to other DOE programs outside of EM.
- Provide transportation and packaging testing and materials infrastructure to respond to identified baseline requirements.
- Coordinate integrated transportation planning and operation functions with all Departmental elements.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue to provide a complex-wide system to ensure internal and external notification of high visibility shipments.			
■ Ensure efficient use of DOE packages through a packaging fleet management system.			
■ Use safety performance criteria to monitor the Department's transportation safety and as a basis for implementing specific operational safety assessments.			
■ Maintain a partnership with the Department of Transportation on performing safety assessments on motor carriers.			
■ Assure technological validity and consistency throughout the complex and provide national and international leadership for transport systems.			
■ Strengthen communications with DOE traffic managers and other programs to maximize effective transportation systems and operations.			
■ Maintain the Department's automated transportation system in support of efficient shipping and tracking throughout the complex. Focus will be on covering all the remaining smaller sites to get as close to 100 percent coverage as possible.			
■ Maintain an efficient regulatory compliance training program.			
■ Provide technical support to field and program offices and to state, tribal, and local governments in preparing for and executing hazardous materials shipping campaigns.			
■ Provide transportation focused forums and communications, with internal program activities and external stakeholders, to identify and resolve transportation issues and participate in specific transportation shipment planning.			
■ Coordinate with the Office of Emergency Management to provide technical assistance initiatives to national and regional stakeholders.			
■ Maintain a corporate transportation information resource center and provide information products and tools to DOE managers, contractors, other Federal agencies, and external parties.			
HQ-TMHQ1	10,509	11,918	11,753

(dollars in thousands)

FY 1998	FY 1999	FY 2000

HQ-EM-HQ-001 / Emergency Management

The Emergency Management Program consists of two programs: Transportation Emergency Preparedness and the Facilities Emergency Preparedness Emergency Management assures that planning, training, and resources are available for the protection and safety of our workers; State, Tribal, and local emergency responders; the public; and the environment in the event of an operational emergency at an EM facility or during the transportation of hazardous materials.

The Transportation Emergency Preparedness Program, a Department-wide program, is designed to ensure that State, Tribal, and local emergency responders have access to the planning, training and resources necessary to respond to transportation accidents involving unclassified, non-weapons shipments of the DOE radioactive materials, and directly supports the accomplishment of priority DOE shipping goals. Shipping activities will increase as defined in the *Accelerating Cleanup: Paths to Closure* plan. The Transportation Emergency Preparedness Program will continue to address the issues raised by stakeholders along the transportation corridors.

The Transportation Emergency Preparedness Program: 1) ensures that DOE meets its transportation emergency responsibilities under federal regulations, the National Contingency Plan, and the Federal Radiological Emergency Response Plan; 2) addresses State, Tribal, and local government concerns about emergency preparedness for DOE radioactive material shipments; 3) coordinates DOE-wide transportation emergency preparedness activities for nonweapons-related radioactive material shipments, and 4) supports emergency responders at all levels of government. Emergency preparedness is the number one concern identified by stakeholders in DOE's shipping campaigns. Also, the Transportation Emergency Preparedness Program activities reinforce DOE's and EM's commitment to openness and full participation, leading to greater public understanding, confidence, and cooperation with EM cleanup and waste activities.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Facilities Emergency Preparedness Program is designed to ensure that both Headquarters and field elements can respond effectively to an operational emergency at an EM facility, as required by DOE Order 151.1. This program provides a system for ensuring EM Headquarter personnel are prepared to provide technical expertise and/or programmatic assistance when an emergency is reported and provides assurance to EM Headquarter senior management personnel that facilities/sites under the purview of EM have adequately addressed emergency preparedness requirements. Planning and assistance activities are conducted by the Facilities Emergency Preparedness Program to establish and maintain a capability to respond to an emergency at an EM facility.			
■ Implementation of the Transportation Emergency Preparedness Program will begin with the eight DOE Regional Coordinating Offices participating; will address emergency management issues raised by stakeholders along DOE transportation corridors; and will update required emergency responder training.			
■ Joint Headquarters and field planning and drill activities will continue to assure effective response in the event of an operational emergency.			
■ The Regional Transportation Emergency Preparedness Program planning and training assistance programs will be in place to provide necessary support to States, Tribes, and local responders.			
■ Emergency planning documents will be updated to ensure an adequate and integrated Headquarters and field response to operational emergencies at EM facilities.			
■ A facility verification program will be developed to ensure adequate emergency response capabilities.			
HQ-EM-HQ-001	3,259	3,218	2,849

(dollars in thousands)		
FY 1998	FY 1999	FY 2000

ID-CMP-001 / National Analytical Management Program

This program is responsible for supporting all EM programs to assure that credible, cost-effective sampling, and analytical needs are met, and the data vital for making decisions regarding waste management and environmental remediation meet the needs of EM, regulators, and the public. The program provides:

- Guidance, training, and technical assistance to field sites in applying streamlined data planning, such as the Data Quality Objective process and Streamlined Approach For Environmental Restoration, across all EM environmental characterization operations, and to assure appropriate data validation and data conformance with regulatory demands;
- Guidance to the field in establishing and maintaining cost-effective sampling and analytical Quality Assurance programs;
- Operations of proficiency testing programs that serve as the basis for evaluating the capabilities of radiochemistry/mixed waste analytical laboratories;
- Assistance in establishing an integrated Field Sample Management program at each operations office to centralize and optimize business management of field characterization systems, and to consolidate and privatize, where appropriate, analytical laboratory capacity to meet DOE analytical needs; and
- Guidance for standardizing contracting for analytical services and standardizing specifications for automated data management and review processes that save substantial time and money. Part of these activities are being carried out in response to the General Account Office Report No. RCED-95-118 "Nuclear Facility Cleanup, Centralized Contracting of Laboratory Analysis Would Produce Budgetary Savings."

- The Department of Energy will collaborate with the Environmental Protection Agency in conducting technology demonstration of environmental decision support software, which focus on environmental decision support.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Will privatize the laboratory accreditation process.			
■ Will finalize the DOE Electronic Data Deliverable format for environmental analytical data.			
■ Will position itself to address the changing needs in analytical services from characterization to decontamination and decommissioning, and long-term monitoring.			
ID-CMP-001	5,205	3,000	3,000

OPS/HQ-PP / Pollution Prevention

The Department's pollution prevention mission is to reduce or eliminate all wastes and pollutants in order to minimize the impact of the Department's operations on the environment, to reduce operational cost, and improve the safety and health of its operations.

Pollution prevention is the Department's preferred approach to reducing waste, mitigating health risks, and protecting the environment, in accordance with the Pollution Prevention Act of 1990. This was evidenced by the Secretary's May 1996 establishment of aggressive source reduction, recycling, and affirmative procurement goals, to be achieved by the end of 1999. Pollution prevention applied within EM can significantly reduce wastes, allowing the cost savings to be used to accelerate the cleanup effort. As in industry, pollution prevention is a core program that helps DOE achieve maximum environmental benefits.

The DOE/EM pollution prevention program directly addresses the fifth Environmental Management *Accelerating Cleanup: Paths to Closure* principle to reduce generation of wastes.

- Maintain effective and compliant pollution prevention programs at over twenty DOE sites to comply with Federal and State laws and regulations related to pollution prevention and waste minimization.
- Prepare annual Waste Generation and Pollution Prevention Progress Report. This report is required to comply with the Programmatic Environmental Impact Statement Lawsuit Settlement and recent Pollution Prevention Executive Orders.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Establish nation-wide pollution prevention teams to assist sites in identifying pollution prevention and cost saving opportunities. The teams will focus on sites with less mature pollution prevention programs and are expected to identify potential savings. Continue gathering data on pollution prevention successes across the complex and distribute the information to all DOE sites to encourage wider applications of demonstrated practices.			
OPS/HQ-PP	23,575	12,790	7,138
Subtotal, Multi-Site	102,315	76,268	67,978

HQ-9999-01 / Federal Contribution to UE D&D Fund Appropriation Account

The Energy Policy Act of 1992 created the Uranium Enrichment Decontamination and Decommissioning Fund to pay for the cost of cleanup of the gaseous diffusion facilities located in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. The Fund also covers the Federal cost to reimburse operating uranium or thorium processing site licensees for the costs of their environmental cleanup at those sites, subject to a specific reimbursement limit. This payment is to cover the Federal government's share of cleanup being carried out at active uranium and thorium processing sites. The Department compensates site owners on a per-ton basis for the restoration costs for those tailings attributable to the Federal government. The Act authorizes annual Fund contributions of $480,000,000, adjusted for inflation, from two sources: up to $150,000,000 from a special assessment on domestic utilities based on the ratio of their separative work unit purchases from the Department to total purchases from the Department including those produced for defense purposes, with the remainder of required funding to come from Government appropriations. The purpose of this activity is to provide the annual Government contribution.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide the FY 2000 Federal Government contribution.			
HQ-9999-01	388,000	398,088	420,000
Total Multi-Site Activities	490,315	474,356	487,978

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQ-PM-001 / Policy and Management	
■ Overall decrease due to reduction/elimination of lower priority activities ($11,631,000) funded at Headquarters and curtailment support to the National Environmental Training Office and strategic planning activities ($657,000). Key increases are required to support the Citizen Monitoring and Technical Assessment Fund ($5,000,000), to fully fund the cooperative programs with ten Indian Nations or pueblos ($1,500,000); and to conduct Post 2006 implementation review and correct deficiencies that surface during the year ($1,445,000).	-4,343
HQ-WM001 / Waste Management	
■ Reduction in funds slightly reduces performance of technical analyses to evaluate complex-wide integration opportunities.	-118
HQ-100-AA / Technical Support to ER	
■ Environmental restoration crosscutting efforts in the areas of performance measure tracking, information/data management integration and project reviews/analysis are slightly reduced.	-30

	FY 2000 vs. FY 1999 ($000)
HQ6002 / Support to Transition Activities	
■ Increase in funding will support the International Institute of Applied Systems Analysis to perform research and to support the Arctic Military Environmental Corporation program.	882
HQNP-NCSP / Nuclear Criticality Safety Program	
■ Increase is driven by the Defense Nuclear Facilities Safety Board Recommendation 97-2 and supports current scope of work as agreed to by other Departmental organizations.	750
HQ-EM74 / Headquarters Program Integration	
■ Increase in funding will fully support the training for DOE nuclear weapons facilities and related sites under the Hazardous Waste Operations Emergency Response program and technical support in the areas of document reviews. Site baseline assessments and crosscutting activities are slightly increased.	973
HQ-EM-75 / Environmental and Regulatory Analysis	
■ Decrease reflects fewer collaborative decision-making processes at different sites with EM presence than was originally anticipated. Additionally, Environmental Management will focus on LandTech implementation at fewer sites than was originally anticipated.	-218
HQ-TMHQ1 / Transportation and Packaging	
■ Decrease in funding is due to a reduction of activities in the institutional coordination area.	-165
HQ-EM-HQ-001 / Emergency Preparedness Program	
■ Decrease in funding is due to completion of the Transportation Emergency Preparedness policy documents in FY 1999 (DOE Order 151.1 Chapter and Guide) and the redesign of the National Transportation Emergency Responder training program.	-369
OPS/HQ-PP / Pollution Prevention	
■ Decrease reflects the Department's expectation of savings from a more efficient Pollution Prevention program as a result of increased pollution prevention accountability by waste generators and successes in building pollution prevention into the Department's operation culture.	-5,652

	FY 2000 vs. FY 1999 ($000)
HQ-9999-01 / Federal Contribution to UE D&D Fund Appropriation Account	
■ Increase in the Federal Contribution to the Uranium Enrichment Decontamination and Decommissioning Fund Appropriation account supports the level required by the Energy Policy Act of 1992, adjusted for inflation.	21,912
Total Funding Change, Multi-Site	13,622

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	28,122	28,551	42,111	13,560	47.5%
Accelerator Improvement Projects	0	0	0	0	0%
Capital Equipment	19,627	18,224	22,905	4,681	25.7%
Total, Capital Operating Expense	47,749	46,775	65,016	18,241	39.0%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
00-D-401 Spent Nuclear Fuel Treatment and Storage Facility, SR	18,500	0	0	0	7,000	11,500
99-D-403 Privatization Phase I Infrastructure Support, RL	30,880	0	0	14,800	13,988	2,092
97-D-402 Tank Farm Restoration and Safe Operations, RL	232,700	7,584	13,961	22,723	20,516	167,916
96-D-408 Waste Management Upgrades, VL (RL Subproject)	12,800	8,229	4,400	171	0	0
95-D-402 Install Permanent Electrical Service, WIPP	5,942	5,766	176	0	0	0
95-D-405 Industrial Landfill V and Construction/Demolition Landfill VII, OR	7,600	5,800	1,800	0	0	0
95-D-407 219-S Secondary Containment Upgrade, RL	5,493	2,600	2,500	393	0	0
94-D-404 Melton Valley Storage Tank Capacity Increase, ORNL	48,000	46,781	1,219	0	0	0
94-D-407 Initial Tank Retrieval Systems, RL	202,000	12,580	10,100	32,860	4,060	142,400
93-D-187 High-Level Waste Removal from Filled Waste Tanks, SR	558,050	244,177	18,220	15,214[a]	8,987	271,452
89-D-174 Replacement High-Level Waste Evaporator, SR	121,604	116,982	4,622	0	0	0
Total, Construction		450,499	56,998	86,161	54,551	595,360

[a] Reflects FY 1999 Conference Mark which transfers $4,512,000 from project 96-D-408, Waste Management Upgrades to project 93-D-187, High-Level Waste Removal from Filled Waste Tanks at the Savannah River Site.

00-D-401, Spent Nuclear Fuel Treatment and Storage Facility, Preliminary & Final Design (Title I & II), Savannah River Site, Aiken, South Carolina (SR-SF09)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

- None.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2000 Budget Request *(Preliminary Estimate)*	1Q 2000	4Q 2002	NA	NA	18,500 *	28,400 *

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
2000	7,000	7,000	5,000
2001	8,500	8,500	9,000
2002	3,000	3,000	4,500

* Preliminary Cost Estimates for the 105-L Treatment and Storage Facility project are based upon the Pre-Conceptual Design dated 3/12/98 as modified by DOE-SR. Design completion is less than 1 percent. The preliminary estimates are: Total Estimated Cost – $154,233,000 and Total Project Cost – $239,879,000. NOTE: Other Project Costs of $9,900,000 are expected during the design only construction project line item. **These estimates are used for the purpose of requesting design funding only. Future construction funding (if requested) will be based upon approximately 35 percent design complete cost estimate and funded as a separate construction line item.**

3. Project Description, Justification and Scope

The Department of Energy Environmental Management Program has the responsibility for the safe, effective, and efficient storage of the current and future inventory of DOE-owned spent nuclear fuel. This spent nuclear fuel, including the returned foreign research reactor and domestic research reactor spent nuclear fuel, will be prepared for disposal and stored in a road-ready condition awaiting placement in a permanent geologic repository. In accordance with the DOE Spent Nuclear Fuel Programmatic Environmental Impact Statement Record of Decision, the Savannah River Site is designated to manage the aluminum clad spent nuclear fuel inventory for the DOE complex, as well as projected receipts for the next 30 to 40 years.

Funding is requested to perform preliminary and final design, (Title I and Title II), of the project, including vendor supplied engineered equipment design. No funding for Title III design or construction activities is requested.

Recent evaluations have confirmed the technical feasibility and potential cost savings for the reuse of the 105-L facility for housing the Treatment and Storage Facility project. Implementation of this approach is projected to save between $100 to $300 million compared to conventional reprocessing of spent nuclear fuel. The project consists of direct de-inventory of the existing wet basins to repository-ready storage via transfer and treatment provisions installed in the 105-L Reactor building. Summary features of the project are:

- Continued receipt at L-Area Disassembly Basin of DOE-owned aluminum clad spent nuclear fuel from Domestic and Foreign Research Reactors using existing equipment. Existing cask decontamination equipment in the Stack Area will also be used.
- Preparation of the spent nuclear fuel for disposal at a national repository using the melt and dilute treatment technology, with new furnaces and associated support equipment, including offgas system, installed in the 105-L process room. Spent nuclear fuel will be transferred to the process room from the L-Area Disassembly Basin via the Deposit and Exit canal using a modified Deposit and Exit conveyor.
- Load treated spent nuclear fuel into a canister/transfer cask, and perform sealing and leak testing operations using new transfer cell and canister preparation equipment installed in the existing Crane Maintenance Area.
- Load transfer cask onto a special transporter in the Stack Area using the existing crane. Transfer the canister of treated spent nuclear fuel to dry interim storage, consisting of a modular storage system installed outside the 105-L building.
- Load canisters of treated spent nuclear fuel into transportation casks for transport off the Savannah River Site for storage or disposal.

In general, the project will make use of existing structures, systems, or components where possible, and add new structures, systems, or components where necessary.

PRELIMINARY ACQUISITION STRATEGY

The Treatment and Storage Facility project implementation strategy consists of two separate line items; an FY 2000 design only construction line item and an FY 2003 construction and start-up line item.

The design only line item was validated in April 1998 and the construction line item will be validated in April 2001.

The goal of the design only project is to provide a well established baseline for the construction estimate and contract. It is planned that the construction project will be validated based upon approximately 35 percent design complete.

The procurement process for engineered equipment will be integrated with the design only project to the extent necessary to allow incorporation of vendor design information into the overall design project. The vendor design process, up through approval of design drawings, will be included in the design only project scope; actual procurement of the engineered equipment will be part of the construction line item scope.

The use of on-site construction forces will be considered, via a documented make or buy process, for those portions of construction activities inside the 105-L facility. Some large activities (e.g., roof repair, outside Disassembly and Removal activities) will be subcontracted by the management and operating contractor, however, contamination levels, security requirements, and operating facility interface requirements limit the opportunity for cost-effective fixed price construction contracts for most of the projected work within the 105-L facility. The use of contracted-out architect/engineer design services will be considered for the dry storage facility.

PROJECT RISKS

The primary risks that could impact the cost and/or schedule of the Treatment and Storage Facility project, if not properly mitigated, are highlighted below, along with planned or existing mitigation activities. However, significant development work and independent reviews have been conducted over the past three years to better define and understand the proposed project. For example, technology development is nearing completion having been validated through bench scale and small scale testing using surrogate materials. The concept has also been validated by third party small scale testing (Argonne National Laboratory) using irradiated samples. Through a Memorandum of Understanding with the Savannah River Site, the Nuclear Regulatory Commission is conducting an ongoing review of the research and development results to ensure that any technical issues are identified and addressed early in the process. In a June 1998 letter report, the Nuclear Regulatory Commission concluded that melt and dilute would be an acceptable concept for geologic disposal of aluminum-based spent nuclear fuel. As final proof-of-concept, Savannah River is preparing an L-Area pilot demonstration, in production form, using actual spent fuel assemblies.

- 105-L Configuration Control

  Lack of an accurate baseline of the existing facility configuration could impact project cost and schedule if not identified until after construction activities begin. Current project plans include an early effort prior to definitive design, including walk downs, to establish an accurate configuration baseline for the project

- Technology Risks

  It is assumed that the technology selected in the Environmental Impact Statement Record of Decision will be melt and dilute. If the alternate technology, direct/co-disposal is selected, the scope of this project will change, including elimination of equipment for treatment, increased characterization equipment and larger dry storage capacity. The Record of Decision is expected in mid 1999 in advance of design activity.

  Offgas system uncertainties and secondary waste stream identification and disposition are the remaining components of technology risk. The centerpiece of the mitigation strategy is the Technology Development program being conducted by the Savannah River Technology Center. Program milestones include the following:

Process Development/Final Technology Report	June 1998
Issue Technical Performance Requirements	July 1998
Performance Requirements Validation	Sept 2000

  Testing of irradiated spent fuel to validate the Functional Requirements is scheduled to be accomplished in FY 2000 in the L-Area pilot demonstration. While there is some risk that this final testing could result in changes to the Functional Requirements, primarily in the area of offgas engineering, this information would be available in sufficient time to be factored into the initial design.

  Acceptance criteria for the Technology Development program have been based on preliminary requirements established by DOE-Office of Civilian Radioactive Waste Management for the geologic repository. Changes to the disposal requirements may impact the Technical Performance Requirements for the Treatment and Storage Facility project. However, EM is working closely with the Office of Civilian Radioactive Waste Management during their development of performance requirements to ensure, to the extent possible, that the melt and dilute disposal form will meet the final repository acceptance requirements as eventually approved by the Nuclear Regulatory Commission.

  Although the technology development program is funded separately from the Treatment and Storage Facility project, it is directed by the same program management organization. This will ensure that the project is, and will continue to be, closely integrated with the technology development program.

- Regulatory/Design Basis Risk

  Potential future movement toward the Nuclear Regulatory Commission regulation of DOE nuclear facilities presents a cost and schedule risk to the Treatment and Storage Facility project, which is currently planned and estimated as a DOE regulated facility. However, the new construction portion of the project (e.g., the dry storage facility) will be constructed to Nuclear Regulatory Commission licensing standards.

- Acquisition Strategy Risk

  The Treatment and Storage Facility project will be accomplished under separate design only and construction projects in FY 2000 and FY 2003, respectively. The design only process will be accomplished in two parts: non-process related (interim dry storage modules and support utilities) which will begin in early FY 2000, and melt and dilute process design integration into the 105-L facility - which will begin later in the fiscal year with input from the L-Area pilot demonstration as discussed above. Both design efforts will be integrated into validating/baselining the FY 2003 construction project.

- Design Maturity Risk

  Design maturity risk is minimal for the design project as a result of previous technology development work, input to be received from the L-Area pilot demonstration, and the standard nature of the design for the dry storage facility. As a result of the two-phased acquisition strategy, subsequent validations of the construction project will be based on a more mature design effort (e.g., 35 percent design completion).

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (81.1% of total estimate cost (TEC))	15,000	NA
Design management costs (1.6% of TEC)	300	NA
Project management (design) (1.1% of TEC)	200	NA
Total, engineering, design, inspection and administration of construction costs (83.8% of TEC)	15,500	NA
Contingencies		
Design phase (16.2% of TEC)	3,000	NA
Total, contingencies (16.2% of TEC)	3,000	NA
Total, line item costs (TEC)	18,500	NA

5. Method of Performance

Design shall be performed under a negotiated architect or engineer contract supported by operating contractor engineering for existing SSC's.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility Cost							
Design	0	0	0	5,000	9,000	4,500	18,500
Total facility costs (Federal and Non-Federal)	0	0	0	5,000	9,000	4,500	18,500
Other project costs							
Other project-related costs	0	0	900	4,500	3,000	1,500	9,900
Total other project costs	0	0	900	4,500	3,000	1,500	9,900
Total project costs (TPC)	0	0	900	9,500	12,000	6,000	28,400

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	NA	NA
Annual facility maintenance and repair costs	NA	NA
Programmatic operating expenses directly related to the facility	NA	NA
Capital equipment not related to construction but related to the programmatic effort in the facility	NA	NA
GPP or other construction related to the programmatic effort in the facility	NA	NA
Utility costs	NA	NA
Other costs	NA	NA
Total related annual funding [a]	NA	NA

[a]This is a construction line-item design only project; therefore, there are no operating costs.

99-D-403, Privatization Phase I Infrastructure Support, Richland, Washington (RL-TW08)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

- None

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	1Q 1999	1Q 2000	1Q 1999	1Q 2001	30,880	39,000
FY 2000 Budget Request *(Current Baseline Estimate)*	"	2Q 2002	3Q 1999	1Q 2002	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	970	970	600
2000	0	0	370
Construction			
1999	13,830	13,830	5,955
2000	13,988	13,988	12,125
2001	2,092	2,092	8,665
2002	0	0	3,165

3. Project Description, Justification and Scope

As part of the Tank Waste Remediation System Privatization Phase I Contract, the United States Department of Energy committed to deliver key utilities and service to the privatization contractor's Low Activity Waste treatment facility. This project will provide the necessary site infrastructure and interface function to meet the commitments. The privatization facility will be located near the southeast corner of the 200 East Area in an area formerly identified for low activity waste grout storage/disposal.

Electrical service (normal power) of up to 20mW will be provided to the privatization facility through a new 230-13.BkV substation located in the 200 East Area.

Raw water, fire suppression and potable water services will be provided the privatization facility through the extension and upgrading of existing 200 East Area water systems.

Effluent transfer piping for non-dangerous effluents will be constructed and installed between the privatization facility and existing liquid effluent piping systems serving the 200 East Area Treated Effluent Disposal Facility and the Liquid Effluent Retention Facility along the east perimeter of the 200 East Area.

Other subprojects provide new roadway construction, extension of temporary power and of raw water to the privatized site and other tasks to prepare the site for eventual privatization construction activities (January 2000) and operations (June 2002). This task will also include the closure and/or replacement of selected wells on the site, rough surface contouring, habitat mitigation, establishment of a site characterization baseline and the development of selected areas for utility corridors and roadways.

The project is essential to supporting numerous Tri-Party Agreement milestones related to pretreatment and immobilization of Low Activity Tank Waste; specifically, those associated with the construction and operations of the Phase I Low Activity Waste facilities, M-60-11, "Start of construction of two (2) Phase I Low Activity Waste facilities..." and M-60-12, "Start operation of two (2) contractor-owned...Phase I Low Activity Waste facilities..." However, the Department decided to proceed with only one treatment facility.

Startup and testing activities will be completed when the liquid effluent transfer lines become operational in FY 2001. All other utilities/service upgrades will be completed in FY 2000. Final roadwork, topping, etc. will be deferred until the privatization contractor has completed construction in FY 2002.

The FY 2000 appropriation will be used to finalize site development and installation of construction utilities, turnover of the site to Privatization Contractor, and finalize construction of production utilities.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (2.1% of total estimated cost (TEC))	650	650
Design management costs (0.5 % of TEC)	150	150
Total, Engineering, design, inspection, and administration of construction costs (2.6% of TEC)	800	800
Construction phase		
Buildings and Improvements to land	3,273	3,273
Specialized equipment	0	0
Other (major utilities/comp items, specialized facilities, etc.)	16,547	16,517
Removal cost less salvage	0	0
Project management	1,130	0
Inspection, design and project liaison, testing, checkout and acceptance	1,370	1,400
Construction management (10% of TEC)	3,100	4,230
Total, construction costs	25,420	25,420
Contingencies		
Design phase (0.6% of TEC)	170	170
Construction phase (14.5% of TEC)	4,490	4,490
Total, contingencies (15.1 % of TEC)	4,660	4,660
Total, line item costs (TEC)	30,880	30,880

5. Method of Performance

Design/inspection and construction will be accomplished using either fixed price design/construct contracts or selected design agent contracts with separate fixed price construction contracts.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility Cost							
Design	0	0	600	370	0	0	970
Construction	0	0	5,955	12,125	8,665	3,165	29,910
Total facility costs (Federal and Non-Federal)	0	0	6,555	12,495	8,665	3,165	30,880
Other project costs							0
Conceptual design cost	555	0	0	0	0	0	555
NEPA documentation costs	0	0	0	0	0	0	0
Other project-related costs	2,147	2,326	1,020	1,870	202	0	7,565
Total other project costs	2,702	2,326	1,020	1,870	202	0	8,120
Total project costs	2,702	2,326	7,575	14,365	8,867	3,165	39,000

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc)	410	TBD
Annual facility maintenance and repair costs	0	0
Other annual funding	410	TBD
Total related annual funding (operating from FY 2002 through FY 2018)	820	0

97-D-402, Tank Farm Restoration and Safe Operations, Richland, Washington (RL-TW03)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- None

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1997 Budget Request *(Preliminary Estimate)*	2Q 1997	2Q 2004	1Q 1999	3Q 2005	248,480	289,239
FY 1998 Budget Request *(Preliminary Estimate)*	"	3Q 2004	3Q 1998	3Q 2007	206,000	273,000
FY 1999 Budget Request *(Title I Baseline)*	"	"	1Q 1998	"	232,700	301,500
FY 2000 Budget Request *(Current Baseline Estimate)*	"	2Q 2004	"	"	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1997	7,584	7,584	3,864
1998	6,500	6,500	5,933
1999	8,500	8,500	7,469
2000	13,000	13,000	12,567
2001	6,716	6,716	2,354
2002	0	0	10,113
Construction			
1997	0	0	0
1998	7,461	7,461	2,567
1999	14,223	14,223	5,416
2000	7,516	7,516	7,949
2001	25,460	25,460	29,822
2002	42,605	42,605	32,492
2003	33,810	33,810	33,810
2004	31,790	31,790	31,790
2005	26,790	26,790	26,790
2006	745	745	19,764

3. Project Description, Justification and Scope

The Tank Farm Restoration and Safe Operations project will provide upgrades for selected tank farm instrumentation control, tank ventilation, waste transfer, and electrical systems in order to restore these systems to an acceptable design basis. Phase I of the project focuses primarily on improvements needed to support waste disposal privatization and routine operations of existing double-shell tank farm facilities (i.e., "Manage Tank Waste") during the Tank Waste Remediation System mission, but also supports initiatives related to single-shell tank stabilization. This project is integrated with other planned/ongoing upgrades, waste retrieval, and major maintenance activities to ensure that the combined upgrades are performed in a cost-effective manner and that they will adequately support the overall Tank Waste Remediation System mission.

The Tank Farm Restoration and Safe Operations Major System Acquisition will provide major upgrades to Hanford's existing Tank Farm facilities in the following areas:

- Instrumentation

  Existing primary tank monitoring instrumentation in the double-shell tank farms will be modified and upgraded for level, temperature, and vapor pressure measurement. The double-shell tank waste transfer system will be upgraded for routine verification and waste transfer verification. The leak

detection system associated with the annulus, leak detection pit, and process/support pits in these tank farms will be upgraded. The master pump shutdown system and associated alarms will also be upgraded. All new instrumentation/control equipment will be capable of providing remote readout and/or alarm at selected manned facilities, resulting in a significant reduction in the amount of manual field data collection in the double-shell tank farms, thereby improving worker efficiency and reducing worker stay time in the radiation zones (implementing an as low as reasonably achievable {ALARA} principle). No new single-shell tank instrumentation is planned to be provided by this project.

- Tank Ventilation

The project will replace the existing primary ventilation systems for Tank Farms 241-AN, -AP, and -AW with new, high-capacity exhaust filtration systems. A new exhaust stack, along with stack effluent monitoring and ventilation control equipment, will be included in these upgrades. New seal pots and associated condensate piping will be installed to support the collection of condensate from the new ventilation systems and return it to the primary tank system. The ventilation systems will be designed to facilitate future installation of additional effluent control equipment, if needed. The project also will provide a new annulus ventilation system for the 241-SY Tank Farm, and replacement ventilation systems for the 244-A and 244-S Double Contained Receiver Tank facilities. The new annulus and primary ventilation systems will be connected to existing underground ductwork. Existing filter trains replaced by this project will be removed and disposed.

The ventilation upgrades will improve worker safety and reduce the risk of radioactive and/or hazardous material releases to the environment by providing improved confinement and monitoring of tank emissions. New off gas treatment/filtration systems and effluent monitoring systems will be provided to ensure compliance with applicable Federal, State, and local emission standards.

- Waste Transfer

New valve manifold assemblies will be provided in selected pits used for the double-shell tank waste transfer operations. In addition, the project will install three new transfer routes (pipe-in-pipe configuration, equipped with appropriate leak detection and cathodic protection capabilities) in the "A Farm Complex" (200 East Area), and three existing transfer lines will be replaced with new lines. Existing pits used for the double-shell tank waste transfer operations will have special protective coating applied to the walls, floor, and underside of cover blocks to provide a decontaminable surface and support compliance with regulatory requirements for secondary containment. New transfer systems will be fully compliant with Resource Conservation and Recovery Act requirements and with Washington State regulations governing hazardous waste handling.

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (15.4% of total estimated cost (TEC))	35,850	48,640
Design management costs (0.0 % of TEC)	0	0
Total, Engineering, design, inspection, and administration of construction costs (15.4% of TEC)	35,850	48,640
Construction phase		
Buildings and improvements to land	130	130
Specialized equipment	97,930	88,120
Other (major utilities/comp items, specialized facilities, etc.)	4,510	4,510
Removal cost less salvage	4,510	4,510
Project management	19,945	9,490
Inspection, design and project liaison, testing, checkout and acceptance	24,570	21,590
Construction management (1.4% of TEC)	3,345	13,800
Total, construction costs	154,940	142,150
Contingencies		
Design phase (2.8% of TEC)	6,450	7,900
Construction phase (15.4% of TEC)	35,460	34,010
Total, contingencies (18.0 % of TEC)	41,910	41,910
Total, line item costs (TEC)	232,700	232,700

5. Method of Performance

The Project Hanford Management Contractor will be responsible for overall project management and integration services for the Tank Farm Restoration and Safe Operations project, as well as for coordination of permitting and safety analysis work in support of the project. Definitive design, inspection, and construction management activities will be performed by the contracted Engineer/Constructor Contractor. Construction work in radiologically contaminated areas, utility tie-ins, and demolition work will also be performed by the Engineer/Constructor. To the extent feasible, construction in uncontaminated areas and procurement shall be accomplished by fixed-price contracts awarded on the basis of competitive bidding. Burial of contaminated materials, health physics technician support, and startup testing/readiness review support will be performed by the Project Hanford Management Contractor.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Outyears	Total
Project cost							
Facility cost							
Design	3,864	5,933	7,469	12,567	2,354	10,113	42,300
Construction	0	2,567	5,416	7,949	29,822	144,646	190,400
Total facility costs (Federal and Non-Federal)	3,864	8,500	12,885	20,516	32,176	154,759	232,700
Other project costs							
Conceptual design cost	13,324	0	0	0	0	0	13,324
NEPA documentation costs	12	0	0	0	0	0	12
Other project-related costs	11,470	1,790	5,700	5,700	8,262	22,542	55,464
Total other project costs	24,806	1,790	5,700	5,700	8,262	22,542	68,800
Total project costs (TPC)	28,670	10,290	18,585	26,216	40,438	177,301	301,500

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc)	NA	NA
Annual facility maintenance and repair costs	NA	NA
Other anual costs	NA	NA
Total related annual funding	NA	NA

94-D-407, Initial Tank Retrieval Systems, Richland, Washington (RL-TW04)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- Determination which of Hanford's twenty-eight double-shell tanks will receive retrieval systems by this project has been revised to reflect programmatic requirements supporting Phase I privatization. Two tanks have been removed from the project: one because only supernate liquids are to be transferred from the tank, eliminating the need for mixer pumps; and another because of issues requiring further research and development related to mixing waste with failed equipment lying on the bottom of the tank. A tank that will receive waste returning from the privatized treatment facility has been added to the project.
- The schedule has been revised to meet programmatic requirements supporting Phase I privatization.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1994 Budget Request (*Preliminary Estimate*)	2Q 1994	4Q 1998	1Q 1995	2Q 2000	210,000	245,000
FY 1995 Budget Request (*Preliminary Estimate*)	"	4Q 1999	4Q 1995	2Q 2001	"	"
FY 1996 Budget Request (*Preliminary Estimate*)	"	2Q 2008	3Q 1996	2Q 2010	315,100	375,200
FY 1997 Budget Request (*Preliminary Estimate*)	4Q 1994	4Q 2007	4Q 1996	"	304,300	358,200
FY 1998 Budget Request (*Title I Baseline*)	"	4Q 2004	2Q 1997	3Q 2008	202,000	229,100
FY 1999 Budget Request (*Title I Baseline*)	"	4Q 2000	1Q 1999	2Q 2005	"	"
FY 2000 Budget Request (*Current Baseline Estimate*)	"	4Q 2004	1Q 2001	2Q 2010	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1994	1,000 [a]	1,000	509
1995	3,380 [b]	3,380	3,151
1996	5,600 [c]	5,600	2,659
1997	5,100 [d]	5,100	4,103
1998	5,600 [e]	5,600	4,771
1999	4,661 [f]	4,100	4,100
2000	4,060	4,060	4,060
2001	4,800	4,800	5,192
2002	4,199	4,760	5,110
2003			4,745
Construction			
1994	0	0	0
1995	0	0	0
1996	0	0	0
1997	2,500 [d]	2,500	2,128
1998	4,500	4,500	2,950
1999	28,199 [f]	28,199	0
2000	0	0	0
2001	19,100	19,100	18,708
2002	23,940	23,940	25,510
2003	26,600	26,600	23,955
2004	20,900	20,900	26,600

[a] Reflects reduction of $6,000,000 for uncosted offset from original appropriation of $7,000,000.

[b] Reflects reduction of $9,020,000 of FY 1995 funds for Productivity Savings and reduction of $5,300,000 current year funds due to defense rescission from original appropriation of $17,700,000.

[c] Reflects reduction of $6,400,000 to meet uncosted offset for FY 1996 from original appropriation of $12,000,000.

[d] Reflects reduction of $5,000,000 for internal reprogramming by the Richland Operations Office from the original appropriation of $12,600,000. The reprogramming moved $5,000,000 to Project No. 89-D-173, Tank Farm Ventilation Upgrades.

[e] Reflects reduction of $5,000,000 for internal reprogramming by the Richland Operations Office from the original appropriation of $15,1000,000. The reprogramming moved $5,000,000 to operating expenses to extend the existing privatization Phase 1A contract from May 1998 until negotiations were completed and a Phase 1B contract was signed (August, 1998).

[f] Does not reflect reduction of $560,730 for uncosted reduction from original appropriation of $32,860,000.

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
2005	14,900	14,900	20,900
2006	11,300	11,300	14,900
2007	11,661	11,661	11,300
2008	0	0	15,400
2009	0	0	1,249

3. Project Description, Justification and Scope

The Initial Tank Retrieval Systems project will provide mixing and pumping systems for retrieval of radioactive wastes from ten of Hanford's 28 double-shell tanks. The contents of these tanks consist of supernatant liquids and settled solids, which must be mixed prior to transferring the waste to treatment facilities or alternative storage. The Initial Tank Retrieval Systems will provide systems to mobilize settled solids and transfer wastes out of the tanks to provide feed to future processing plants, and allow near-term consolidation of tank wastes to restore useable double-shell tank storage capacity. This double-shell tank storage space is required to allow safe storage of alternate waste streams, such as waste from the single-shell tanks. Additionally, the dilution and waste removal capabilities provided by Initial Tank Retrieval Systems will remediate the flammable gas issue in several of the flammable gas watch list double-shell tanks.

Existing equipment installed in the double-shell tanks only allows the removal and transfer of supernatant liquids, and is incapable of suspending and removing the settled solids. Without the waste mixing, dilution, and removal functions provided by the Initial Tank Retrieval Systems, there will be no ability to provide feed to future processing plants, consolidate waste solids, and remediate flammable gas issues.

The typical retrieval system for the ten tanks consists of 300 horsepower mixer pumps to mobilize solids in the tank and a transfer system for removal of the tank contents. Tank internal components, such as thermocouple trees, will be replaced with higher strength equipment to withstand the forces induced by the mixer pumps. Monitoring and control systems will be installed to measure performance of the mixer pumps and tank operations. Remote decontamination equipment and disposable containment equipment will be utilized for removal and disposal of tank components.

The FY 2000 budget request will be used for continuing design of three retrieval systems and associated project management.

4. Details of Cost Estimate [a] [b]

	(dollars in thousands) Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (12.6% of total estimated cost (TEC))	25,520	25,520
Design management costs (3.6 % of TEC)	7,250	7,250
Total, Engineering, design, inspection, and administration of construction costs (16.2% of TEC)	32,770	32,770
Construction phase		
Buildings and improvements to land	1,380	1,380
Specialized equipment	79,590	79,590
Other (major utilities/comp items, specialized facilities, etc.)	24,570	24,570
Removal cost less salvage	5,630	5,630
Project management	4,900	4,900
Inspection, design and project liaison, testing, checkout and acceptance	10,910	10,910
Construction management (3.3% of TEC)	6,750	6,750
Total, construction costs	133,730	133,730
Contingencies		
Design phase (2.8% of TEC)	5,630	5,630
Construction phase (14.8% of TEC)	29,870	29,870
Total, Contingencies (17.6 % of TEC)	35,500	35,500
Total, line item costs (TEC)	202,000	202,000

5. Method of Performance

The project is managed for Richland by the Project Hanford Management Contractor.

[a] Estimate is based on the Title I design estimate, dated January 1996 and as modified to incorporate change requests and modification of the list of tanks to receive retrieval systems to meet the Waste Feed Delivery mission.

[b] Escalation rates were calculated from the February 1995 update of the economic escalation price change indices for DOE construction projects by the "Office of Infrastructure Acquisition, FM-50".

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility Cost						
Design	10,422	4,771	4,100	4,060	15,047	38,400
Construction	2,128	2,950	0	0	158,522	163,600
Total facility costs (Federal and Non-Federal)	12,550	7,721	4,100	4,060	173,569	202,000
Other project costs						
Conceptual design cost	1,609	0	0	0	0	1,609
NEPA documentation costs	10	0	0	0	0	10
Other project-related costs	4,884	1,480	1,150	4,600	13,367	25,481
Total other project costs	6,503	1,480	1,150	4,600	13,367	27,100
Total project costs (TPC)	19,053	9,201	5,250	8,660	186,936	229,100

7. Related Annual Funding Requirements

(FY 2005 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.)	250	250
Annual facility maintenance and repair costs	50	50
Total related annual funding (*operating from FY 2005 through FY 2018*)	300	300

93-D-187, High-Level Waste Removal from Filled Waste Tanks, Savannah River, Aiken, South Carolina (SR-HL12)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

- Tank Farm Support Service Upgrades scope of work has been adjusted to facilitate improved project management and work execution between this line item project and project 99-D-402, "Tank Farm Support Services, F Area".
- All F Tank Farm Support Service Upgrade work scope has been transferred to project 99-D-402.
- All H Tank Farm Support Service Upgrade work scope has been consolidated into this line item project.
- The planned rebaselining of this line item project will reflect the scope deletions and additions. This rebaselining is currently scheduled for completion in the second quarter of FY 1999. Revised total estimated cost/total project cost annual spending projections will be made as part of the FY 2001 Budget submission.
- FY 2000 funding request does not include allowance for Salt Disposition Process Upgrades. Alternative studies are underway to determine the best approach. Additional funding will be requested when the approach decision is made.

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1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1993 Budget Request *(Title I Baseline)*	2Q 1993	1Q 1994	3Q 1994	4Q 1999	86,500	88,640
FY 1994 Budget Request *(Title I Baseline)*	"	"	"	"	"	"
FY 1995 Budget Request *(Title I Baseline)*	1Q 1979	4Q 1999	2Q 1980	3Q 2005	602,700	991,446
FY 1996 Budget Request *(Title I Baseline)*	"	2Q 2006	"	4Q 2008	565,050	828,238
FY 1997 Budget Request *(Title I Baseline)*	"	"	"	"	"	"
FY 1998 Budget Request *(Current Baseline Estimate)*	"	4Q 2006	"	"	558,050	821,238
FY 1999 Budget Request *(Current Baseline Estimate)*	"	"	"	"	"	"
FY 2000 Budget Request *(Current Baseline Estimate)*	"	"	"	"	"	"

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1993	0	0	0
1994	70,000 [a]	70,000	70,000
1995	6,269 [a]	6,269	6,269
1996	4,016	4,016	4,016
1997	4,415	4,415	4,415
1998	4,500	4,500	5,106
1999	5,781	5,781	5,781
2000	1,000	1,000	1,000
Outyears	43,026	43,026	42,420
Construction			
1993	2,000 [a]	0	0
1994	116,802 [a]	118,802	114,117
1995	16,406 [a b]	16,406	18,964
1996	15,684	15,684	11,364
1997	8,585 [c]	8,585	13,785
1998	13,720 [d]	13,720	12,101
1999	9,433	9,433	9,433
2000	7,987	7,987	7,987
Outyears	228,426	228,426	231,292

[a] This represents the operating expense funded costs through FY 1994 of the three previously operating expense funded projects. Also, represents the actual operating expense funded costs through FY 1994. Previously reported operating expense costs of $192,420,000 were an estimate. The adjustment of $8,618,000 reflects the difference between the estimated value and actual value ($183,802,000). The original appropriation was $3,000,000.

[b] Use of current year ($1,700,000) funds for Productivity Savings and ($2,150,000) for FY 1995 rescission.

[c] Reflects use of prior year funds to meet uncosted offset to FY 1997 appropriation. Project total estimated cost is reduced as a result due to better than expected fixed-price contract costs.

[d] Reflects FY 1998 reprogramming of $700,000. The original appropriation was $17,520,000.

3. Project Description, Justification and Scope

The purpose of this project is for removal and processing of waste which is essential for maintaining the Defense Waste Processing Facility operations to meet Federal Facilities Compliance Agreement, waste processing commitments, and Savannah River Site commitments to minimize high-level liquid waste in storage, and to provide support for continued waste receipts. This project supports the Federal Facilities Agreement commitment to discontinue the use of waste tanks which do not provide adequate secondary containment (Type I, II, and IV tanks).

The High-Level Waste Removal from Filled Waste Tanks line item project is broken into two subprojects. The first subproject, S-W183 "Waste Removal" provides the facilities necessary to remove waste from tanks and the second subproject, S-7719 "Processing Facility Upgrades" provides processing upgrades required to support future processing requirements. It is expected that additional subprojects will be added over the life of the High-Level Waste System.

The Waste Removal subproject had previously been divided into four subprojects (S-2081, Waste Removal Phase II; S-3291, Type III Tank Salt Removal, Tank Salt Removal Phase I; S-2860, Type III Tank Salt Removal Phase II; and S-3025, Waste Removal Facilities Phase III) with additional scope slated to be added in the future. These subprojects were combined into one single subproject "Waste Removal" to reduce project management/project control requirements via implementation of a simpler and more efficient work breakdown structure. In general, the waste removal facilities include slurry pumps, transfer pumps, transfer jets, structural support steel and associated instrumentation, and distributed control systems. The project will provide equipment so that salt and/or sludge can be removed and transferred to either Salt Processing or Extended Sludge Processing for eventual feed to the Defense Waste Processing Facility. The waste removal process will be performed and funded by operating funds. The project, however, will provide the modifications to tank systems and services, as necessary, to isolate tanks from the waste removal process prior to tank closure.

The FY 2000 funds for this project will support design and construction consistent with the High-Level Waste System Plan, including completion of the West Hill engineering and inspection upgrades construction, initiation of design for tanks 7F and 11F, and continue engineering and inspection upgrades for H Area.

The waste removal facilities for nine additional Type III F and H tanks will be added to Waste Removal subproject in the rebaselining efffort.

The "Processing Facilities Upgrade" subproject S-7719 will include facility modifications to Defense Waste Processing Facility, Salt Processing, Saltstone, and Effluent Treatment Facility in order to allow the efficient processing of salt and sludge waste through the High-Level Waste System. These upgrades have not been fully defined and will be necessary throughout the life of the High-Level Waste System. The first of these upgrades includes upgrades in Defense Waste Processing Facility to support the processing of higher curie content sludge. Salt Disposition alternative studies are underway to determine the best approach. The next upgrade will implement the recommendations from the salt disposition alternative studies that are underway to determine the best approach to salt processing from a safety, cost, and schedule standpoint. It is expected that other process modifications will be required in the future.

If funds are not appropriated for this project, the plant will not meet the required Federal Facilities Agreement and Site Treatment Plan regulatory commitments and Defense Waste Processing Facility will not have the feed necessary to operate.

4. Details of Cost Estimate [a]

(dollars in thousands)

	Current Estimate	Previous Estimate
Design phase		
Preliminary and final design costs (20.7% of total estimated cost (TEC))	115,525	122,468
Design management costs (1.3% of TEC)	7,374	0
Total, engineering, design, inspection, and administration of construction costs (22.0% of TEC)	122,899	122,468
Construction phase		
Buildings & improvements to land	6,936	6,936
Specialized equipment	213,163	212,732
Other (major utilities/comp items, specialized facilities, etc.)	96,798	96,798
Removal cost less salvage	12,000	12,000
Inspection, design and project liaison, testing, checkout and acceptance	21,952	21,984
Construction management (3.5% of TEC)	19,636	19,667
Total, construction costs	370,485	370,117
Contingencies		
Design phase (2.9% of TEC)	16,108	38,332
Construction phase (8.7% of TEC)	48,558	27,133
Total, contingencies (11.6% of TEC)	64,666	65,465
Total, line item costs (TEC)	558,050	558,050

5. Method of Performance

Design will be performed by Bechtel Savannah River design engineering and a project engineering services contract or a fixed-price subcontract. Construction and procurement will be accomplished utilizing fixed-price subcontracts awarded on the basis of competitive bidding, where possible.

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[a] The cost estimate basis for this project is a combination of Title I and Conceptual Design Report estimates. Costs and schedule for the nine additional tanks are not included in this estimate but will be included in the rebaselining effort.

The DOE escalation rates (percent per year) used for this estimate are as follows: FY 1993-2.4%; FY 1994-2.5%; FY 1995-3.5%; FY 1996-3.5%; FY 1997 3.5%; FY 1998 3.5%; FY 1999 3.3%; FY 2000 3.3%; Outyears 3.3%.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project cost						
Facility cost						
Design	84,700	5,106	5,781	1,000	42,420	139,007
Construction	158,230	12,101	9,433	7,987	231,292	419,043
Total facility costs (Federal and Non-Federal)	242,930	17,207	15,214	8,987	273,712	558,050
Other project costs						
Conceptual design cost	800	0	0	0	0	800
Other project-related costs [a]	24,916	5,725	7,846	5,446	218,455	262,388
Total other project costs	25,716	5,725	7,846	5,446	218,455	263,188
Total project costs (TPC)	268,646	22,932	23,060	14,433	492,167	821,238

7. Related Annual Funding Requirements

(FY 1998 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs (staff, utilities, etc.) [b]	6,650	6,100
Annual facility maintenance and repair costs	2,850	2,000
Other annual costs	0	500
Total related annual funding *(operating from FY 1998 through FY 2010)*	9,500	8,600

[a] Includes $262,388,000 to fund permitting activities, Post Modification Testing Reviews, one-time program development startup, and operating contractor project support.

[b] Includes operating manpower, supplies and energy and additional operators. It is essential that operation of this facility will result in a net annual cost increase of $6,100,000 and 56 full time equivalents. This facility does not replace an existing facility.

Science and Technology

Program Mission

Science and Technology is a national program that provides the full range of capabilities from directed research through technical and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated, technically defensible solutions for cleanup and long-term stewardship at DOE sites.

Program Goal

The goal of Science and Technology is to provide users with the most efficient, effective environmental cleanup technologies and technical solutions possible and on a schedule that enables achieving cleanup and bringing into compliance most of the DOE complex by 2006. This will be accomplished through investment in the Science and Technology program that is planned and managed in an interactive, coordinated, participatory relationship with Environmental Management cleanup project managers and stakeholders. The program, which represents the majority of DOE's Environmental Quality Business Line Research and Development Portfolio, supports basic through applied research, technology development and demonstration, and technical assistance to support deployment, and will draw from the best available technical expertise.

These activities, for which funds are requested, directly support goals outlined in the *Accelerating Cleanup: Paths to Closure* in which over 500 technology needs were identified with 86 pathways or events on the critical path to closure with medium to high technology risk, and over 200 waste streams with medium to high technology risk.

Program Objectives

- **To focus science and technology research and development on DOE's high priority needs** -- Conduct scientific research and technology development through "focus areas" on highest priority end-user needs identified by the sites: Mixed Waste Characterization, Treatment and Disposal; Radioactive Tank Waste Remediation; Subsurface Contaminants; Deactivation and Decommissioning; and Plutonium Stabilization and Disposition. Needs are prioritized within each site as well as nationally to ensure work is focused on the problems with the biggest impact.
- **To invest technology development funding to reduce major costs and uncertainties** -- Direct funds to activities where the potential for significant cost reduction is high.
- **To Reduce EM's technological risk** -- Direct funds to activities that reduce programmatic risk associated with technical uncertainties that exist in the critical path to site closure.

- **To facilitate accelerated deployment of cost- and schedule-reducing alternative technology** -- Involve customers in all phases of Science and Technology planning and decision making activities and bridge the gap between development and use to ensure that new technology is rapidly deployed through site-based assistance at the sites, including sponsoring accelerated site technology deployment projects that will provide valuable documentation of performance.
- **To develop and implement a targeted scientific research agenda** -- Conduct, in partnership with DOE's Office of Science and in tandem with the "focus areas," a long-term basic research program that will result in transformational or breakthrough approaches for solving the Department's most intractable environmental problems, such as the subsurface contaminants in the vadose zone and groundwater.

Performance Measures

The success of the Science and Technology program is currently measured by:

- The number of technologies or technology systems (30) demonstrated that meet performance specification-based needs as identified by the Site Technology Coordinating Groups.
- The number of technologies or technology systems (30) made available for implementation with cost and engineering performance data.
- The number of deployments (60) of alternative technology in cleanup activities, an Environmental Management corporate measure shared by the EM user organizations, which are responsible for technology selections.

Significant Accomplishments and Program Shifts

- Implement an Environmental Management Research and Development Program Plan that "maps" investments in solutions to project manager identified needs. Extend Science and Technology program's role to provide the full range of resources and capabilities needed to deliver and support fully developed, deployable solutions from basic research through deployment.
- Disseminate research results from early successes of researchers funded through the Environmental Management Science Program. Continue support of quality scientific resources both in the United States and internationally. Scientists that have been funded through the Environmental Management Science Program are currently conducting research at 89 universities, 13 Department of Energy laboratories, and 21 other governmental and private laboratories. These are located in 37 states and the District of Columbia, Canada, Australia, Russia and the Czech Republic. Of the 235 research awards, 126 are collaborative efforts involving funding at two or more institutions.
- Issue scientific research awards in FY 1999 in the areas of subsurface contamination/vadose zone and effects of low dose radiation. Research focused on subsurface contamination/vadose zone issues will assist the Department in addressing problems identified at the Hanford site and other DOE sites with similar problems. Research on the effects of low dose radiation will help to identify potential health and ecological effects from exposures and risks from low dose radiation.

- Complete, in FY 1999, development and demonstration of alternatives to open flame combustion high temperature treatment (i.e., incineration). These technologies support facility compliance at 6 states and can address approximately 5,400 m^3 of mixed low-level and transuranic waste.
- Increase work, in FY 1999, for the stabilization and in situ remediation of contamination in the vadose zone and groundwater, including work to provide bioremediation and natural attenuation technologies to avoid costly and risky excavation, ex situ treatment and offsite disposal.
- Continue, in FY 1999, multi-year tasks performed in cooperation with the Environmental Protection Agency to improve landfill caps, covers, and barriers to prevent the migration of wastes from DOE sites. The Environmental Protection Agency will incorporate the data from these successful demonstrations into national landfill cover design guidance.
- Expect to complete, in FY 2000, a Large Scale Demonstration and Deployment Project initiated in FY 1998 in cooperation with the EM Environmental Restoration program to deactivate and decontaminate a tritium production facility at Mound. This Large Scale Demonstration and Deployment Project will showcase 8 - 12 innovative technologies for remote characterization and decontamination and dismantlement of tritium-contaminated equipment and surfaces.
- Deploy, in FY 1999, a system (Pulsed Air Mixing) that will introduce pulses of air at the bottom of Gunite and Associate Tank W-9 in order to mobilize the thick sludge that rests at the bottom, a problem in a number of DOE radioactive waste storage tanks. The Pulsed Air Mixing system is now part of Oak Ridge Reservation's Waste Conditioning System.
- Assume lead, in FY 1999, for the Plutonium Stabilization and Disposition Focus Area, formerly located within the Environmental Management Nuclear Material and Facility Stabilization Program.
- Complete multi-year Technology Deployment Initiative site cleanup projects that were initiated in FY 1998 and continue accelerated site technology deployment projects initiated in FY 1999. These deployment projects, which were selected competitively based on a multi-application performance specification, are designed to accelerate widespread deployment of innovative technologies by providing proof of performance documentation. Aggressive use of the alternative technologies in which the Department has invested optimizes the cost savings they enable. In FY 2000 deployment assistance is considered an integral Focus Area function, rather than a separate program.

Uncertainties are inherent in any research program, and the allocations of funding requested below represent the best estimates at the time this budget was formulated. It is possible that as circumstances change, or new higher-priority risks are identified by the site, it may be necessary to redirect funds within the Science and Technology program categories to accommodate these changes..

The proposed funding for the Science and Technology program is summarized below.

FY 2000 Budget Summary *

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Mixed Waste, Characterization, Treatment and Disposal Focus Area	38,934	19,990	23,404

The Mixed Waste, Characterization, Treatment, and Disposal Focus Area provides technical and engineering solutions for supporting effective, efficient mixed Waste treatment technology systems. Site Treatment Plans identified 165,000 m^3 of mixed and transuranic waste in storage that includes over 2,300 mixed waste streams at 36 sites. *Accelerating Cleanup: Paths to Closure* has identified 21 high priority technology needs in the mixed and transuranic waste areas. It also identified 34 waste streams with high technology risk. Ten of 48 pathways/events on the critical path pose high technology risk. With the funding provided, this Focus Area will assist in the deployment of alternative technologies at individual sites and implement and maintain sound program management and integration processes. The Mixed Waste, Characterization, Treatment, and Disposal Focus Area includes the following systems:

Material Handling and Characterization Solutions (FY 2000 funding $18,209,000) are being developed to characterize radionuclide components in boxes destined for disposal at Waste Isolation Pilot Plant or other subtitle C facility, to enhance payload capacity of transuranic waste containers, and to develop automated handling systems for mixed waste material during characterization, treatment, packaging, and disposal.

Non-Thermal Treatment Solutions (FY 2000 funding $5,195,000) are being developed as an alternative to high temperature treatment systems because of the low risk and high regulatory and public acceptance. Activities will include alternative oxidation technology treatment and stabilization alternatives for plutonium 238 contaminated waste and polychlorinated biphenyl mixed waste.

* The following nine pages are a synopsis of the budget request for the Office of Science and Technology and is provided for ancillary information.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Radioactive Tank Waste Remediation Focus Area	52,513	41,676	48,847

The Radioactive Tank Waste Remediation Focus Area addresses 34 high priority needs in the development and deployment of technologies to remove high-level waste in over 270 large radioactive and other miscellaneous underground storage tanks across DOE containing over 90 million gallons of waste (nine waste streams with high technology risks), and prepare it for final disposal. Closure of these tanks will mitigate further risks to ground water and surrounding populations, and contribute significantly to mortgage reduction. Within the funding provided, the Radioactive Tank Waste Remediation Focus Area will assist individual sites in the deployment of alternative technologies to reduce risk and cost, and accelerate cleanup at those sites. The Radioactive Tank Waste Remediation Focus Area includes the following activities:

Tank Waste Retrieval and Closure (FY 2000 funding $19,744,000) will focus on techniques to ensure tank integrity prior to and during retrieval operations, which includes tank inspection, corrosion monitoring, saltcake dissolution and sludge heel retrieval, and ultimate tank closure at Idaho, Oak Ridge, Savannah River, and Richland. Activities related to the Hanford Tank Initiative will be continued at a reduced level under the Tank Waste Retrieval and Closure Product Line.

Tank Waste Pretreatment and Immobilization (FY 2000 funding $29,103,000) will be developed and deployed to further optimize high-level waste glass loadings and performance and melter design, provide alternative paths to salt waste treatment to replace in tank precipitation, improve slurry and waste feed preparation, and minimize the volume and corresponding disposal cost of high-level and low-level waste forms to be produced.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Subsurface Contaminants Focus Area	32,870	31,611	35,080

The Subsurface Contaminants Focus Area addresses technological solutions for the 5,700 known DOE ground water plumes that involve 475 billion gallons of contaminated water and 75 million m^3 of contaminated soil. There is an additional 3 million m^3 of leaking wastes buried in landfills, trenches, and spill areas. The *Accelerating Cleanup: Paths to Closure* has identified 57 high priority needs, 25 waste streams with high technology risk and 42 of 281 pathways/events on the critical path with high technology risk within the Environmental Restoration problem area. The Subsurface Contaminants Focus Area currently encompasses three problem areas to address these needs, organic solvent remediation, containment (barriers caps and covers), and metal and radionuclide plumes. Within the funding provided, this Focus Area will assist individual sites in the deployment of alternative technologies to reduce risk and cost, and accelerate cleanup at those sites. The Subsurface Contaminants Focus Area includes the following activities:

Dense Non-Aqueous Phase Liquids (FY 2000 funding $18,829,000) constitute a generic class of particularly difficult to locate, quantify, and treat or destroy organics that contaminate both the vadose and saturated zones at many DOE sites. Activities will focus on better understanding the long term movement and fate of these contaminants to better design treatment strategies. Treatment systems will be demonstrated and deployed, including advanced bioremediation and natural attenuation, in situ passive and reactive barriers, and in situ treatment technologies applicable to a broad range of geologies in the vadose and saturated zones, including deep access.

Source Term Containment/Source Term Remediation (FY 2000 funding $5,372,000) prevents the further spread of contaminants to limit associated risks and cleanup costs. Technologies for deep barrier placement, improved longer life surface caps, landfill hot spot removal or stabilization, and verification monitoring will be demonstrated and deployed.

Metals and Radionuclides in the Vadose and Saturated Zones (FY 2000 funding $10,879,000) cannot be destroyed and therefore, must be either stabilized or removed. Efforts will continue to develop improved characterization, monitoring and modeling techniques and to verify the performance of reactive and passive barrier systems at Rocky Flats and Oak Ridge. Technologies will be deployed to chemically stabilize or remove contaminants at Hanford, Mound and Albuquerque.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Deactivation and Decommissioning Focus Area	29,466	22,938	17,112

The Deactivation and Decommissioning Focus Area develops, demonstrates, and facilitates implementation and deployment of efficient and cost effective technologies through a series of Large Scale Demonstration Projects which address real needs pertaining to the 20,000 radiologically/hazardous waste contaminated buildings and facilities. The near-term goal is to reduce the EM deactivation and decommissioning mortgage of $4 billion through FY 2006 by 25% or a net reduction of approximately $1 billion. Within the funding provided, this focus area will assist individual sites in the deployment of alternative technologies to reduce risk and cost, and accelerate cleanup at these sites. The *Accelerating Cleanup: Paths to Closure* has identified 34 high priority needs. Eleven of 30 pathways/events are on the critical path with high technology risk. The Large Scale Demonstration Projects include:

Reactor Facilities (FY 2000 funding $4,733,000) technologies will be demonstrated and deployed to address underwater visual inspection, characterization and dismantlement, as well as removal and treatment of highly contaminated fuel pool sludges, debris and water. Technologies to facilitate decontamination and decommissioning of the 14 surplus production reactors across the DOE complex to a degree such that they can be put in interim safe storage for up to 50 years will be demonstrated and deployed.

Radionuclide Separation Facilities (FY 2000 funding $6,525,000) Improved technologies are required to deactivate and decommission radionuclide separation facilities, including gaseous diffusion plants, chemical separation facilities, uranium recycling facilities, lithium enrichment facilities, heavy water production facilities and tritium production facilities. Technologies to characterize, separate and decontaminate metals for internal DOE recycle or free release will be demonstrated and deployed.

Fuel and Weapons Component Fabrication Facilities (FY 2000 funding $5,854,000) Improved and innovative technologies are required to deactivate and decommission fuel and weapons component fabrication facilities including uranium milling and refining facilities, fuel and target fabrication facilities, weapons component fabrication facilities and weapons assembly, dismantlement, modification and maintenance facilities. Improved and innovative technologies will be demonstrated and deployed to address building deactivation and decommissioning and metal/concrete waste disposal/recycling at tritium contaminated facilities.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Plutonium Stabilization and Disposition Focus Area	0	5,480	4,253

The Plutonium Stabilization and Disposition Focus Area will be operating under the aegis of the Office of Science and Technology beginning in FY 1999. The program operated under the Office of Nuclear Material and Facility Stabilization since its inception in FY 1995. The program addresses the technology needs associated with the stabilization and disposition of plutonium and other fissile materials and address the Secretarial commitments pursuant to the Defense Nuclear Safety Board recommendations as well as other safety vulnerability studies. *Accelerating Cleanup: Paths to Closure* has identified 21 high priority needs in the nuclear materials problem area. Four of 19 pathways/events on the critical path pose high technology risk. Within the funding provided, this Focus Area will assist individual sites in the deployment of alternative technologies to reduce risk, cost, and accelerate cleanup at these sites.

Plutonium Stabilization Technology Development (FY 2000 funding of $3,653,000) will develop improved processes to stabilize plutonium (approximately 20 metric tons) left in the weapons production pipelines in various storage configurations and plutonium residues (approximately 150 metric tons).

Alternative Stabilization Process for Fissile Materials Solutions (FY 2000 funding of $600,000) Will test waste solution containing americium and curium for absorption on porous crystalline matrix and support the Savannah River Site in scale-up tests with actual americium and curium solution.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
University Programs	21,605	19,215	14,900

Universities provide a unique opportunity to cooperate with the academic community in the development of fundamental data related to the application of technology development and the follow-up activities related to the resolution of technical issues and system optimization. Attention is given to providing credible data, from non-conflicted, recognized experts in support of activities related to the acceptance of innovative technologies by the regulators and stakeholders.

Florida State University (FY 2000 funding $1,900,000) in partnership with Eastern and Central European Institutes are evaluating the transfer of European technologies to solve DOE cleanup problems.

Mississippi State University (FY 2000 funding $4,000,000) continues its support to the Focus Areas in the development of monitors for thermal treatment of mixed waste and development of sensors to measure high-level waste in transfer pipes.

Florida International University (FY 2000 funding $5,000,000) is initiating a program to improve Robotic decontamination and decommissioning equipment that will be used in highly radioactive environments.

Robotics University Program (FY 2000 funding $4,000,000) is supporting deactivation and decommissioning efforts for mapping of facilities and the remote handling of materials.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Idaho Technology Validation and Verification Program	14,500	13,500	22,500

The capabilities of the Idaho National Engineering and Environmental Laboratory will be utilized to support and enhance application and deployment of innovative cleanup and waste management technologies across the DOE complex through technology validation and verification and systems engineering activities.

Validation and Verification (FY 2000 funding $14,500,000). Technology validation and verification activities will be used to support and enhance application and deployment of EM innovative and alternative technologies across the DOE complex and to provide a solid technical base for EM cleanup, reduce costs, and leverage the DOE investment into broader national priorities.

Systems Engineering (FY 2000 funding $8,000,000). Systems engineering activities will be used to refine baselines for EM waste management, spent nuclear fuel, and nuclear materials disposition and identify new opportunities to accomplish more efficient and cost effective cleanup and closure of DOE sites. An EM integration activity is conducted utilizing multi-site teams to develop, evaluate, and recommend alternatives to existing baselines for waste management, spent nuclear fuel, and nuclear materials disposition.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Western Environmental Technology Office	13,393	13,000	10,504

For more than two decades, DOE has used the Western Environmental Technology Office as a test facility, where MSE Technology Applications, Inc., engaged in the research, testing, demonstration, development and application of innovative technologies. In FY 1996, agreements were reached to privatize the Western Environmental Technology Office facility with a 5-year contract through 2001. Privatization will fulfill DOE's financial and management obligations and reduce the Government's costs in contracting services. Under this contract, MSE Technology Applications, Inc. focuses on meeting the high priority technology needs associated with the Mixed Waste Characterization, Treatment and Disposal Focus Area and the Subsurface Contaminants Focus Area. In addition, to support these Focus Areas, MSE works as a demonstration, testing and evaluation center for sponsored technology systems and has the capability to perform life cycle systems engineering analyses on innovative technology systems to maximize the chances of successful implementation and deployment of these technology systems..

Controlled Emissions Demonstration (FY 2000 funding $3,500,000) By 2002, the four operational DOE hazardous waste thermal treatment units must be able to meet the Environmental Protection Agency Maximum Achievable Control Technology Rule or be shutdown. The Maximum Achievable Control Technology Rule states that a compliance plan must be submitted to the Environmental Protection Agency for covered operations within 180 days of promulgation of the rule (January 1999). Noncompliance with the Maximum Achievable Control Technology Rule will threaten DOE's ability to meet compliance agreements. Promising, technologically mature off gas monitoring and treatment systems, which are being tested for organic and inorganic hazardous air pollutants, should address this challenge of emission compliance by 2002.

Subsurface Contaminant and In Situ Remediation (FY 2000 funding $4,300,000) Activities will support the Subsurface Contaminants Focus Area in addressing the problems/needs identified in the following areas: Subsurface Barrier Systems, Vadose Zone Stabilization, In Situ Passive Treatment, Deep Access and Delivery Methods, Containment/Stabilization Verification and Monitoring. This investment directly supports the Subsurface Contaminants Focus Area in their efforts to help meet all 10 Operation Offices requirements, schedules and "Accelerating Cleanup: Paths to Closure" plan goals while directly contributing to cost reduction, schedule compression and risk minimization.

Engineering Analysis (FY 2000 funding $2,704,000) Technical assistance and life cycle systems analysis are critically important to achieving the successful deployment of treatment, remediation, and containment technology systems. These activities will focus on the analysis of technology systems which are ready candidates for implementation and deployment, and on matching newly developed technologies with DOE urgent clean up needs to enhance deployment opportunities and on providing technical assistance to developers and users to assure successful deployment.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Technology Acceptance and Support	12,822	17,522	14,900

The Technology Acceptance and Support program stimulates wider acceptance of emerging technologies through program and technical peer reviews of technologies, site needs/technology linkage identification and deployment assistance, and longer-term regulatory initiatives. In addition, this activity provides sound business assistance and overall program analysis as well as information dissemination services and linkages to the international scientific community.

Program Information, Review, and Analysis (FY 2000 funding $6,050,000) provides assistance for the Office of Science and Technology business practices, such as preparation of execution guidance and analysis of cost and schedule variances through the DOE Center for Acquisition and Business Excellence. Office of Science and Technology alignments with site needs are collected and provided to the overall EM *Accelerating Cleanup: Paths to Closure* data collection and analysis activity. Independent external peer review processes and program reviews enhance acceptability of key Focus Area decisions and data. Program information and communication provides the Office of Science and Technology with the ability to collect, maintain, analyze, and disseminate key information. Cost savings and benefit analyses highlight potential and actual *Accelerating Cleanup: Paths to Closure* mortgage reductions.

Regulatory and Site Acceptance (FY 2000 funding $6,550,000) contributes to overall Environmental Management mortgage reduction by helping states establish acceptance verification protocols and reciprocity guidelines to expedite multi-state permitting and multi-site deployment. Site acceptance is facilitated by identifying site needs to the Focus Areas as early as possible to ensure the Focus Areas are working on the right problems. Site participation in technology deployment planning and workshops to encourage use of innovative technologies are also included.

International Technology Coordination (FY 2000 funding $600,000) by connecting with international technical capabilities, expands the number of cost-saving innovative technologies available for Environmental Management use through the Focus Areas. Accelerates the EM cleanup by leveraging international science and technology opportunities.

Safety Testing (FY 2000 funding $1,700,000) reduces costs of cleanup by expediting the deployment of Environmental Management technologies and improves worker safety and health by providing operational assessments of high impact environmental technologies and recommending safety, efficiency, and productivity enhancements.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Small Business Innovative Research Program (Technology Development)	0	2,224	2,000

Funding is requested for the Small Business Innovative Research assessment in accordance with Public Law 102-564, which mandates a percentage of all research and development dollars be set aside for grants to small businesses. Once funding is appropriated, it is transferred to the DOE Office of Science for award and administration of grants to small businesses.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Environmental Management Science Program	46,110	47,000 [a]	32,000 [a]

The EM Science Program was created to stimulate basic research and technology development for cleanup of the Nation's nuclear weapons complex. The program's objective is to improve the effectiveness of the cleanup effort over the long term. The importance of basic scientific research to the cleanup mission was established in the Secretary of Energy Advisory Board (Galvin) Report: "There is a particular need for long term, basic research in disciplines related to environmental cleanup...Adopting a science-based approach that includes supporting development of technologies and expertise...could lead to both reduced cleanup costs and smaller environmental impacts at existing sites and to the development of a scientific foundation for advances in environmental technologies."

The Science Program represents a partnership between the Office of Science and the EM program. The Office of Science manages the solicitation of proposals and scientific review process. EM ensures that the research is relevant to the Department's cleanup problems. Science projects funded to date focus on critical problems identified through: 1) workshops at Richland, Savannah River, Oak Ridge, and Idaho; 2) a complex-wide needs survey; 3) solicitation of science research needs in support of the *Accelerating Cleanup: Paths to Closure*; and 4) a systems engineering analysis. To date, of the 235 projects selected, 82 focus on science needed to improve remedial action process; 68 focus on finding better ways to treat and destroy high level waste; 32 focus on waste containing a mixture of radioactive and other hazardous materials (mixed waste); 18 focus on better understanding the health and ecological effects associated with environmental cleanup options; 8 address the materials used in weapons production (nuclear materials); 22 projects focus on technical problems with facility deactivation and decommissioning, and the remaining 5 projects focus on spent nuclear fuel stabilization and disposal. This competitive program has been effective in establishing a link between the EM program and the scientific community. Fourteen of DOE's national laboratories and 96 academic institutions, other Federal laboratories and industrial organizations currently participate in the program. FY 1999 is the last year of funding for the first 136 grants awarded by the program, a $115,000,000 investment, and FY 2000 is the last year of funding for the 66 projects funded in FY 1997, a $46,400,000 investment.

[a] Includes Small Business Innovative Research assessment, in the amounts of $1,162,000 and $765,000 in FY 1999 and FY 2000, respectively.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Environmental Management Risk Policy Program	7,000	9,000	5,000

Risk informed decision making is critical to the success of the EM program. The EM Risk Policy Program provides the analytical framework and technical support necessary for credible, risk-based environmental decisions. The program provides guidance and tools to assist the project managers in collection of the information that will ensure that high risk projects are prioritized and funded and that risk to workers, the public, and the environment decrease over time. This program supports the risk research needed to support aggressive environmental cleanup of the nuclear weapons production legacy while ensuring that the safety and health of the DOE workforce and members of the public, and the protection of the environment are not compromised in the process.

Funding Profile

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Mixed Waste, Characterization, Treatment, and Disposal Focus Area	38,934	19,990	23,404	3,414	17.1%
Radioactive Tank Waste Remediation Focus Area	52,513	41,676	48,847	7,171	17.2%
Subsurface Contaminants Focus Area	32,870	31,611	35,080	3,469	11.0%
Deactivation and Decommissioning Focus Area	29,466	22,938	17,112	-5,826	-25.4%
Plutonium Stabilization and Disposition Focus Area	0	5,480	4,253	-1,227	-22.4%
University Programs	21,605	19,215	14,900	-4,315	-22.5%
Idaho Technology Validation and Verification Program	14,500	13,500	22,500	9,000	66.7%
Western Environmental Technology Office	13,393	13,000	10,504	-2,496	-19.2%
Technology Acceptance and Support	12,822	17,522	14,900	-2,622	-15.0%
Small Business Innovative Research Program (Technology Development)	0	2,224	2,000	-224	-10.1%
Environmental Management Science Program	46,110 [a]	47,000	32,000	-15,000	-31.9%
Environmental Management Risk Policy Program	7,000	9,000	5,000	-4,000	-44.4%
Total, Science and Technology	269,213 [b]	243,156 [b c]	230,500 [b c]	-12,656	-5.2%

Public Law Authorizations:

Public Law 95-91, Department of Energy Organization Act (1977)

Public Law 105-245, The Energy and Water Development Appropriations Act, Fiscal Year 1999

Public Law 105-261; Strom Thurmond National Defense Authorization Act for Fiscal Year 1999

Public Law 103-62; Government Performance and Results Act of 1993

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[a] Excludes $678,000 for general reduction to FY 1998 Defense EM appropriation.

[b] Includes capital equipment estimates of $3,000,000 for FY 1998, $2,500,000 for FY 1999, and $2,000,000 for FY 2000.

[c] Final distribution of funds by program category in FY 1999 and FY 2000 could change based upon changing priorities, and final receipt, review, selection, and award of technical proposals.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Allied Chemical (MO)	1,200	167	167	0	>999.9%
Los Alamos National Laboratory (NM)	9,411	6,389	2,253	-4,136	-64.7%
Sandia National Laboratory (NM)	6,263	7,209	1,428	-5,781	-80.2%
Lovelace Biomedical and Environmental Research Institute (CO)	450	122	0	-122	-100.0%
Mid-West Research Institute (CO)	210	221	0	-221	-100.0%
Grand Junction Project Office (CO)	0	0	166	166	>999.9%
Albuquerque Operations Office (NM)	11,400	8,511	6,370	-2,141	-25.2%
Total, Albuquerque Operations Office	28,934	22,619	10,384	-12,235	-54.1%
Chicago Operations Office					
Ames Laboratory (IA)	1,145	1,102	155	-947	-85.9%
Argonne National Laboratory (West) (ID)	6,353	3,428	535	-2,893	-84.4%
Brookhaven National Laboratory (NY)	2,530	1,189	822	-367	-30.9%
Chicago Operations Office (IL)	5,509	5,842	3,040	-2,802	-48.0%
Total, Chicago Operations Office	15,537	11,561	4,552	-7,009	-60.6%
Idaho Operations Office					
Idaho National Engineering and Environmental Laboratory (ID)	26,029	28,587	32,888	4,301	15.0%
Idaho Operations Office (ID)	20,957	21,121	47,837	26,716	126.5%
Total, Idaho Operations Office	46,986	49,708	80,725	31,017	62.4%
Federal Energy Technology Center (FETC)					
West Virginia	60,245	42,237	37,799	-4,438	-10.5%
Pennsylvania	12,643	13,000	10,504	-2,496	-19.2%
Total, Federal Energy Technology Center (FETC)	72,888	55,237	48,303	-6,934	-12.6%
Nevada Operations Office					
Nevada Operations Office (NV)	2,713	2,765	2,621	-144	-5.2%
Oak Ridge Operations Office					
Oak Ridge Inst. For Science and Education (TN)	508	170	0	-170	-100.0%
Oak Ridge Operations Office (TN)	28,588	26,490	17,039	-9,451	-35.7%
Total, Oak Ridge Operations Office	29,096	26,660	17,039	-9,621	-36.1%
Oakland Operations Office					
Lawrence Berkeley National Laboratory (CA)	3,962	3,455	700	-2,755	-79.7%
Lawrence Livermore National Laboratory (CA)	4,192	3,540	0	-3,540	-100.0%
Oakland Operations Office (CA)	240	1,672	2,477	805	48.1%
Total, Oakland Operations Office	8,394	8,667	3,177	-5,490	-63.3%

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Ohio Operations Office					
Fernald Environmental Management Project (OH)	2,851	990	1,567	577	58.3%
Mound (OH)	2,336	0	645	645	>999.9%
Ohio Operations Office (OH)	590	6,385	3,920	-2,465	-38.6%
Total, Ohio Operations Office	5,777	7,375	6,132	-1,243	-16.9%
Richland Operations Office					
Pacific Northwest National Laboratory (WA)	20,918	14,696	10,322	-4,374	-29.8%
Richland Operations Office (WA)	12,554	11,956	2,541	-9,415	-78.7%
Total, Richland Operations Office	33,472	26,652	12,863	-13,789	-51.7%
Rocky Flats Office					
Kaiser Hill (CO)	750	2,925	2,800	-125	-4.3%
Rocky Flats Office (CO)	3,220	900	430	-470	-52.2%
Total, Rocky Flats Office	3,970	3,825	3,230	-595	-15.6%
Savannah River Operations Office					
Savannah River Site (SC)	8,421	10,966	22,339	11,373	103.7%
Savannah River Operations Office (SC)	1,650	3,835	9,142	5,307	138.4%
Total, Savannah River Operations Office	10,071	14,801	31,481	16,680	112.7%
Headquarters					
Washington, D.C.	11,375	13,286	9,993	-3,293	-24.8%
Total, Science and Technology	269,213 [d]	243,156 [c]	230,500 [b]	-12,656	-5.2%

[d] Excludes $678,000 for general reduction to FY 1998 Defense EM appropriation.

[c] Final distribution of funds by field office in FY 1999 and FY 2000 could change based upon changing priorities, and final receipt, review, selection and award of technical proposals.

Mixed Waste, Characterization, Treatment and Disposal Focus Area

Mission Supporting Goals and Objectives

Program Mission

The mission of the Mixed Waste Characterization, Treatment and Disposal Focus Area is to provide technical capabilities and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated, technically defensible solutions for cleanup and long term stewardship of mixed hazardous and radioactive wastes at DOE sites.

Program Goal

The goal of the Mixed Waste Characterization, Treatment and Disposal Focus Area is to provide technical and engineering solutions for supporting effective, efficient mixed waste treatment technology systems. Site Treatment Plans identified 165,000 m^3 of mixed waste in storage that includes over 2,300 mixed waste streams at 36 sites. In addition, an estimated 181,000 m^3 of mixed low-level waste and transuranic waste will be generated over the next five years.

Program Objectives

The objective of the Mixed Waste Characterization, Treatment and Disposal Focus Area is to develop technologies that address the mixed-low-level and mixed transuranic waste needs identified by the Site Technology Coordination Groups and that have been incorporated in the Department's *Accelerating Cleanup: Paths to Closure* strategy. Having developed and assessed several primary mixed waste treatment systems, the current Mixed Waste Characterization, Treatment and Disposal Focus Area strategy emphasizes development and deployment of enabling technologies to assist the Department in meeting its mixed waste schedule commitments to regulators and the public at 40 sites in 19 states. With the funding provided, this Focus Area will assist in the deployment of alternative technologies at individual sites and implement and maintain sound program management and integration processes.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 60 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by Focus Area, that will be demonstrated, made ready for implementation or deployed is made available after final FY 2000 project level funding is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are schedule to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- Complete, in FY 1999, development and demonstration of alternatives to open flame combustion high temperature (i.e., incineration). These technologies support facility compliance at 6 States and can address approximately 5,400 m^3 of mixed low-level and transuranic waste.
- Complete, in FY 2000, deployment of the neutron interrogation technology for the assay of waste containers at Los Alamos National Laboratory, Rocky Flats, Oak Ridge, and Idaho. This process minimizes risks to workers since it reduced the number of drums that must be manually opened for analysis and enables certification of a significant number of drums that cannot be certified by any other technique.
- Deploy, in FY 2000, hydrogen gas getters to reduce flammable gas concentrations in drums of waste being shipped to the Waste Isolation Pilot Plant. This will allow large amounts of waste to be contained in each drum.
- Demonstrate, in FY 2000, assay capabilities for remotely handled waste and demonstrate screening methods for segregation of large quantities into transuranic versus low-level waste.
- Demonstrate at Savannah River, in FY 2000, the capability to remotely segregate transuranic waste from low-level waste.
- At the end of FY 1999, thermal treatment systems (i.e., incineration) and mercury contamination activities will be discontinued and program emphasis will shift to non-thermal treatment solutions and characterization and handling technology needs of transuranic waste for shipment to the Waste Isolation Pilot Plant.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Material Handling and Characterization Solutions	16,007	11,852	18,209	6,357	53.6%
Non-Thermal Treatment Solutions	13,538	4,877	5,195	318	6.5%
Thermal Treatment Enabling Solutions	9,389	3,261	0	-3,261	-100.0%
Total, Mixed Waste, Characterization, Treatment and Disposal Focus Area	38,934	19,990	23,404	3,414	17.1%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Material Handling and Characterization Solutions

All major sites and laboratories that will ship transuranic waste to the Waste Isolation Pilot Plant have identified technology needs in preparing waste for shipment and disposal. While current technologies focus primarily on enabling the successful management of low activity, contact handled transuranic wastes in 55-gallon drums, a large portion of the waste consists of categories for which assay, handling and transportation is not currently available. Solutions for improving the end-users' capability to non-destructively examine containerized waste and assay the contents to distinguish between radioactive and hazardous constituents will be developed and deployed. The need for non-destructive analysis technology is especially critical for remote handled waste types and to facilitate the segregation of transuranic waste from low-level waste. A reduction of costs can be achieved through non-destructive analysis of wastes to be treated at the three incinerators operated by DOE at Oak Ridge, the Savannah River Site, and Idaho. Activities will also focus on increasing the payload efficiency of transuranic waste shipments to treatment and disposal facilities by addressing hydrogen gas generation and buildup and improving the end-users' capability to remotely handle highly radioactive waste streams during sizing, repackaging and transport operations. Hydrogen gas generation and build-up due to radiolysis of hydrogenous waste materials and subsequent potential flammability/explosion concerns during transport, limit the amount of contact handled and remote handled transuranic waste that can be shipped using the TRUPACT-II and 72B casks. Also, because of the hazard associated with these wastes, advanced remote handling systems are needed to improve safety and efficiency of operations. All activities relating to identification, development and assessment of technologies will be closely coordinated with the National Transuranic Waste Management Program at the Department of Energy Carlsbad Area Office.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The proposed Maximum Achievable Control Technology standard will require a detailed characterization of all waste prior to it being treated in a thermal treatment unit. At the present time, there is no effective method to provide the required characterization. Improved radionuclide non-destructive analysis characterization methods are needed to support elimination of waste from small quantity sites such as Mound and Battelle Columbus.

In FY 2000, there are three distinct work elements which support this product line: 1.) Non-destructive Characterization for Treatment, Transportation and Disposal of Mixed Low-Level/Mixed Transuranic Waste; 2.) Payload Enhancement for Transportation of Transuranic Waste within Regulatory Limits; and 3.) Handling Mixed Waste Contaminants Materials during Characterization, Treatment, Packaging and Disposal.

- Continue algorithm and hardware development and deployment of improved assay technology systems for boxed wastes. Activities include hardware/algorithm improvements to systems identified through FY 1998 and FY 1999 demonstrations/evaluations.
- Complete the deployment of the neutron interrogation technology for the assay of the Resource Conservation and Recovery Act metal in waste containers.
- Develop and demonstrate solutions to meet Waste Isolation Pilot Plant remote handled waste assay requirements. Technology development will focus on demonstration of remote handled waste assay capabilities on real waste streams; implementation of improved assay components in remote handled waste characterization systems; development of mobile non-destructive analysis capability based on demonstrated methods; and demonstration of screening methods to support segregation of large components into transuranic versus low-level waste.
- Evaluate and deploy technologies, such as, improved Hydrogen getters, filters, and alternative packaging materials to minimize impact of hydrogen gas on transportation.
- Evaluate effects of gamma radiation on hydrogen gas generation.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Deploy automated transuranic waste sorting system at the Savannah River Site to verify and prepare drummed waste for transfer to Waste Isolation Pilot Plant. This system will open drums, gain access to contents, remove non-compliant items and repackage waste to meet Waste Isolation Pilot Plant acceptance criteria.			
■ Adapt the Savannah River Site automated waste sorting system to a mobile format for use at Mound and Battelle Columbus sites to prepare waste for transfer to Waste Isolation Pilot Plant.			
■ Develop robust sizing technology for use at Richland to allow segregation of large transuranic and low-level waste to reduce final volume of wastes transferred to Waste Isolation Pilot Plant.			
■ Complete automated contaminant analysis process for metals and organics.			
Material Handling and Characterization Solutions	16,007	11,852	18,209

Non-Thermal Treatment Solutions

Regulatory and public concerns have resulted in specific instances where alternatives to incineration must be used for treatment of mixed waste prior to disposal. Stakeholders are highly supportive of alternatives to open flame treatment systems because of reduced secondary waste generation. Although the number of potential waste streams amenable to this type of treatment is limited, these technologies, in certain instances, provide preferable treatment alternatives. Demonstrations will provide performance data on guidelines for selection of the most appropriate technology for treatment of a given waste. Activities developing and deploying solutions for destroying organics in waste using non-flame alternatives to incineration will primarily focus on Alternative Oxidation Technologies. These processes are needed to treat difficult, DOE tri-mixed waste streams, including mixtures of transuranic, polychlorinated biphenyl, tritium, actinides, mercury, or problematic hazardous chemical contaminants.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
In FY 2000, there is one work element which support this Product Line: 1.) Alternatives to Incineration to Reduce Emission Hazards.			
■ Issue an Alternative Oxidation Technology Request for Proposal to the private sector to demonstrate treatment of the Savannah River Site Plutonium-238 contaminated waste, such as clothing, rags and packaging.			
■ Issue an Alternative Oxidation Technology Request for Proposal to the private sector for a process to treat polychlorinated biphenyl contaminated mixed waste.			
■ Demonstrate a tritiated waste treatment technology.			
■ Deploy stabilization and volume reduction technologies at Oak Ridge, Rocky Flats, and Idaho.			
Non-Thermal Treatment Solutions	13,538	4,877	5,195
Thermal Treatment Enabling Solutions			
Activities include developing and deploying solutions for improving the off gas control and monitoring of the Department's waste incinerators to meet the proposed Maximum Achievable Control Technology Rule limits. If cost effective alternatives for the Maximum Achievable Control Technology compliance are not available for the DOE's three incinerators, located at Idaho, Savannah River and Oak Ridge, and Idaho's high-level liquid waste calciner, they may be forced to shut down in FY 2001. This will impact the ability of these sites to meet compliance agreements. Specific problem areas include mercury and dioxins and furans. The development of control and monitoring solutions for these off gas treatment systems must be proven effective to make these technologies more widely applicable.			
■ This activity will not be continued into FY 2000.			
Thermal Treatment Enabling Solutions	9,389	3,261	0
Total, Mixed Waste, Characterization, Treatment and Disposal Focus Area	38,934	19,990	23,404

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Material Handling and Characterization Solutions	
■ Increase supports focus on developing, demonstrating and deploying technologies that address technology needs for characterizing and handling transuranic waste for shipment to the Waste Isolation Pilot Plant	6,357
Non-Thermal Treatment Solutions	
■ Increase supports efforts to develop, demonstrate and deploy technologies, primarily Alternative Oxidation Technologies, which offer non-flame alternatives to incineration of organics in waste	1,028
■ Technology development activities related to stabilization of salt and ash waste will be completed in FY 1999 and mercury contamination technology development will not be continued in FY 2000	-710
Thermal Treatment Enabling Solutions	
■ Thermal Treatment (i.e., incineration) activities will be discontinued in FY 2000	-3,261
Total Funding Change, Mixed Waste, Characterization, Treatment and Disposal Focus Area	3,414

Radioactive Tank Waste Remediation Focus Area

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Radioactive Tank Waste Remediation Focus Area is to provide technical capabilities and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated technically defensible solutions for cleanup and long term stewardship of radioactive tank waste at DOE sites.

Program Goal

There are 271 large radioactive waste storage tanks and more than 63 miscellaneous underground storage tanks across the DOE complex containing over 90 million gallons of radioactive waste. Most of these tanks have exceeded their design life and represent significant occupational and public risks. Current site baseline technologies are costly, pose significant programmatic and safety risks, and have technology gaps. The goal of the Radioactive Tank Waste Remediation Focus Area is to systematically manage the development and facilitate the deployment of technologies using an integrated approach to safely and efficiently achieve tank waste remediation across the DOE complex in support of the *Accelerating Cleanup: Paths to Closure*. Accomplishment of this goal will support closure of tank farms complex-wide while minimizing life-cycle costs.

Program Objectives

The objective of this Focus Area is to address the technical needs identified for management of high-level waste and closure of tanks by the Site Technology Coordination Groups which have been incorporated in the Department's *Accelerating Cleanup: Paths to Closure* strategy. The Tank Waste Remediation Focus Area activities have progressed from early-stage technology development to advanced, fully deployable systems. This work is being accomplished in close partnership with users and with continual participation of tribal governments, regulators, and stakeholders. Within the funding provided, this Focus Area will assist in the deployment of alternative technologies at individual sites and implement and maintain sound program management and integration processes.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 60 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by Focus Area, that will be demonstrated, made ready for implementation or deployed, is made available after final FY 2000 project funding level is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are scheduled to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- Deploy, in FY 2000, saltcake dissolution and sludge heel (hardened waste at the bottom of tanks) retrieval technologies to enable closure of the Savannah River Site and Hanford high-level waste tanks. Current methods require the introduction of large amounts of water to re-dissolve or suspend wastes in a solution.
- Deploy, in FY 2000, robotic/remote technologies to permanently seal, from the inside, the openings of Gunite and associated tanks at Oak Ridge from pipes that were once used to deliver radioactive waste to the tanks. Capping from the outside has not prevented rain water from leaking into the tanks.
- Demonstrate and deploy, in FY 2000, tank inspection technologies to ensure tank integrity at Idaho, Oak Ridge, Hanford, and Savannah River.
- Demonstrate and deploy, in FY 2000, caustic recycle and recovery technologies that reduce the volume of low level waste streams returning to the Defense Waste Processing Facility Storage Tanks to avoid construction of an additional grout vault at Savannah River.
- Beginning in FY 2000, program emphasis will increase on pretreatment, immobilization and volume reduction technology development to enable high-level waste tank closures across the DOE complex.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Tank Waste Retrieval and Closure	27,529	22,552	19,744	-2,808	-12.5%
Tank Waste Pretreatment and Immobilization	24,984	19,124	29,103	9,979	52.2%
Total, Radioactive Tank Waste Remediation Focus Area	52,513	41,676	48,847	7,171	17.2%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Tank Waste Retrieval and Closure			
Hanford and the Savannah River Site must maintain and ensure tank integrity as tanks will be used for storage up to 30 more years to meet accelerated cleanup goals and tank integrity inspections must occur at Hanford, Savannah River, Idaho, and Oak Ridge prior to initiating waste retrieval operations leading to closure. In order to facilitate the closure of tanks at the Savannah River Site and Hanford technologies need to be developed that will remove sludge and saltcake at rates to support waste processing. Oak Ridge must close tanks to meet Comprehensive Environmental Response, Compensation, and Liability Act requirements for the gunite and associated tanks.			
In FY 2000, there is one work element which supports this Product Line: 1.) Technology Development to Support Tank Closure.			
■ Deploy saltcake dissolution and sludge heel retrieval technologies to remove waste and allow closure of the Savannah River Site and Hanford high-level waste tanks that are not potential leakers.			
■ Deploy robotic/remote operational retrieval technologies for hard-to-access tanks at Oak Ridge (functional flow analysis tanks) and the Savannah River Site (solvent extraction tanks).			
■ Deploy robotic/remote technologies for isolating, stabilizing, and closing Gunite and associated tanks at Oak Ridge.			
■ Deploy technologies for maintaining safe storage conditions by monitoring corrosion in tanks at Hanford and the Savannah River Site.			
■ Demonstrate and deploy tank inspection technologies to ensure tank integrity before waste retrieval and tank closure at Idaho, Oak Ridge, Hanford, and Savannah River Site.			
■ Continue Hanford Tanks Initiative activities at a reduced level.			
Tank Waste Retrieval and Closure	27,529	22,552	19,744

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Tank Waste Pretreatment and Immobilization

The Savannah River Site, Hanford, and Idaho require improved baseline treatment process development and improvement to meet their regulatory schedules. Savannah River must maintain Defense Waste Processing Facility operations and improve throughput to meet canister production requirements; Hanford must prepare for, and deliver feed for privatization Phase 1, accept immobilized product from the private vendor, and develop the baseline data to support privatization Phase 2 procurement package; Idaho must continue baseline flowsheet development and testing to meet Title 1 design schedule. Sludge transfer at Oak Ridge Melton Valley Storage Tanks must be accomplished to meet privatization schedules.

Specific activities for Savannah River will develop and test next generation melter designs and process control methods to enhance Defense Waste Processing Facility throughput, reduce operating costs, and eliminate melter pour spout problems; demonstrate and implement integrated processes for the Defense Waste Processing Facility to support continued sludge-only feed, and reduce the volume of high-level waste canisters produced; and support development and testing of a new chlorinated solvents removal flowsheet for Savannah River to replace in-tank precipitation. In-Tank Precipitation shutdown at Savannah River severely impacts the ability of the site to maintain Defense Waste Processing Facility operations to meet regulatory requirements and *Accelerating Cleanup: Paths to Closure* goals. Caustic recycle and sodium recovery technologies will be developed to reduce the volume of low-level waste and avoid construction of an additional grout vault at Savannah River.

For Hanford, methods and standards will be developed and tested for low-level and high-level immobilized waste product acceptance for Hanford Phase 1 and 2 to minimize risk of accepting waste from privatization contractors that is not adequately processed; and delivery of a privatization-feed sampling and analysis system to ensure Phase 1 feed delivery meets contract requirements; develop and test baseline sludge and leachate processing to ensure adequate feed delivery and avoid conditions that may cause unwanted solids formation that would deploy feed delivery to privatization vendors.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Support to the Idaho National Engineering and Environmental Laboratory will provide technical data required to define the integrated flowsheet for Title 1 design including dissolution of calcine, transuranic waste, cesium, and strontium removal, and low-activity waste and high-activity waste immobilization to enable discontinuation and retrieval of all tank farm wastes to meet the Governor's agreement (Batt Agreement).

Technical solutions delivered through the completion of these activities will: help optimize melter design and operation, and ensure quality low-level and high-level waste products at Hanford, Oak Ridge, Idaho, and Savannah River; help provide alternative solutions to the In-Tank Precipitation process for treatment of high-level at Savannah River, enable treatment of newly generated waste streams that are adding to existing tank waste volumes at Savannah River, Idaho, and Oak Ridge; provide the technical data required to enable operations that separate solids and liquids prior to pretreatment and vitrification of sludges at Savannah River and enable Privatization success at Oak Ridge, and Hanford; and help reduce the volume of high-level and low-level waste forms at Savannah River, Idaho, Hanford, and Oak Ridge.

In FY 2000, there are four distinct work elements which support this Product Line: 1.) High Level Waste Immobilization and Product Acceptance; 2.) Alternative Paths to Salt Waste Treatment; 3.) Pretreatment to Reduce Volume of High-Level Waste and Low-Level Waste Forms; and 4.) Slurry Preparation for Feed to High-Level Waste Vitrification.

- Provide data bases, standards, and tests to meet waste analytical glass standards and provide a basis for long-term performance.
- Provide data for design of second generation pour spout and melter to optimize waste throughput.
- Optimize glass formulation to improve waste loading of radionuclides, thereby minimizing glass generation.
- Support and test a new cesium-removal flowsheet for Savannah River site to replace In-Tank Precipitation.
- Demonstrate settle-decant process to separate solids and liquids as a first step in sludge processing at Savannah River and Hanford.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Demonstrate feed delivery systems including variable depth sampling, automated in-line laser ablation/mass spectroscopy, and sludge monitors at Hanford.			
■ Deploy cross-flow filtration at Oak Ridge.			
■ Provide technical data required for the Defense Waste Processing Facility operations with sludge at Savannah River and for Hanford Phase 2 privatization sludge treatment to reduce the high-level waste production.			
■ Support development of integrated process for acidic tank waste treatment required to meet Batt Agreement.			
■ Demonstrate and deploy caustic recycle and recovery to reduce the volume of low-level waste streams and avoid construction of an additional grout vault at Savannah River.			
Tank Waste Pretreatment and Immobilization	24,984	19,124	29,103
Total, Radioactive Tank Waste Remediation Focus Area	52,513	41,676	48,847

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Tank Waste Retrieval and Closure	
■ Decrease reflects reduced level of effort for Hanford Tanks Initiative (-$4,000), offset by an increase to support activities to develop, demonstrate and deploy retrieval technologies to facilitate closure of tanks at Savannah River and Oak Ridge; robotic/remote technologies for isolating, stabilizing and closing tanks at Oak Ridge; tank inspection technologies to ensure tank integrity of tanks at Idaho, Oak Ridge, Hanford and Savannah River (+$1,192)	-2,808
Tank Waste Pretreatment and Immobilization	
■ Increase supports activities to develop, demonstrate and deploy technologies to: reduce volumes of high-level and low-level waste forms at Savannah River, Idaho, Hanford and Oak Ridge; provide alternative solutions to the In-Tank Precipitation process for treatment of high-level at Savannah River; enable treatment of newly generated waste streams that are adding to existing tank waste volumes at Savannah River, Idaho and Oak Ridge; and technical data to enable separation and vitrification of waste at Savannah River and enable Privatization success at Oak Ridge and Hanford	9,979
Total Funding Change, Radioactive Tank Waste Remediation Focus Area	7,171

Subsurface Contaminants Focus Area

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Subsurface Contaminants Focus Area is to provide technical capabilities and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated, technically defensible solutions for cleanup and long term stewardship of soils and groundwater at DOE sites.

Program Goal

The goal of the Subsurface Contaminants Focus Area's mission is to develop, demonstrate, and facilitate the deployment of innovative technologies that accomplish characterization, monitoring, containment, and long-term isolation of buried waste areas and achieve in situ remediation of dispersed contaminants while reducing cost of remediation, and risk to health and safety, meeting regulatory compliance requirements, and enabling technical solutions where none presently exist.

Across the DOE complex, 5,700 plumes contaminate more than 75 million m^3 of soil and 475 billion gallons of ground water with volatile organic compounds, Dense Non-Aqueous Phase Liquids, hazardous metals and radionuclides. There is an additional 3 million m^3 of solid radioactive and hazardous wastes buried in landfills, trenches, and spill areas. The contaminants pose significant health and safety risks and are present at all DOE sites, located at various depths in the vadose and saturated zones. In order to meet the *Accelerating Cleanup: Paths to Closure* goals and Federal and state compliance laws, cleanup must be accelerated and cleanup costs reduced. The Subsurface Contaminants Focus Area is coordinating vadose zone research efforts with all DOE operations offices, especially Richland in their efforts for remediation of contaminants under the high level waste tanks.

Program Objectives

The objective of this Focus Area is to develop technologies that address environmental restoration problem area needs identified by the Site Technology Coordination Groups and have been incorporated in the Department's *Accelerating Cleanup: Paths to Closure* strategy. Implementation of this program in an integrated manner with other Federal agencies, industry, national labs, and universities will result in faster cleanup and lower cost to the taxpayer. With the funding provided, this Focus Area will assist in the deployment of alternative technologies at individual sites and implement and maintain sound program management and integration processes.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 60 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by Focus Area, that will be demonstrated, made ready for implementation or deployed, is made available after final FY 2000 project level funding is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are scheduled to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- In FY 1999 and FY 2000, increased program emphasis will be on addressing characterization and delineation of Dense Non-Aqueous Phase Liquids in the vadose zone, saturated zone and deep, complex geologic settings.
- Continue, in FY 1999, multi-years tasks performed in cooperation with the Environmental Protection Agency to improve landfill caps, covers and barriers to prevent the migration of wastes from DOE sites. The Environmental Protection Agency will incorporate the data from these successful demonstrations into national landfill cover design guidance.
- Deploy, in FY 2000, seismic reflection technology at Savannah River to enable non-invasive location/distribution of free phase Dense Non-Aqueous Phase Liquids.
- Deploy, in FY 2000, in situ vadose zone chemical treatment technologies at Paducah, Kentucky and Portsmouth, Ohio, Nevada Test Site, and Richland.
- Complete, in FY 2000, Phase II multi-Federal agency demonstration for the removal of Dense Non-Aqueous Phase Liquids contamination from soil at Cape Canaveral using heating technologies and surfactant flushing.
- Deploy, in FY 2000, containment and cover systems in support of Richland vadose zone integration and Columbia River protection efforts.
- Complete, in FY 2000, deployment of advanced landfill cover at the Nevada Test Site.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Dense Non-Aqueous Phase Liquids	12,722	15,002	18,829	3,827	25.5%
Source Term Containment/Source Term Remediation	9,778	6,604	5,372	-1,232	-18.7%
Metals and Radionuclides in the Vadose and Saturated Zones	10,370	10,005	10,879	874	8.7%
Total, Subsurface Contaminants Focus Area	32,870	31,611	35,080	3,469	11.0%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Dense Non-Aqueous Phase Liquids (Delineation, Removal or In Situ Treatment)

All major DOE sites have groundwater contamination resulting from the discharge into the soil of difficult to remediate, toxic and carcinogenic solvents termed Dense Non-Aqueous Phase Liquids. Dense Non-Aqueous Phase Liquids are difficult to locate, and even in small quantities, create large contaminated groundwater plumes. The dense nature and low solubility of these compounds allows them to move downward through the vadose zone and groundwater and to spread laterally along low permeability layers forming disseminated pools, which slowly contaminate groundwater. No capability exists to cost effectively locate Dense Non-Aqueous Phase Liquids sources; therefore, pump-and-treat, or other costly and ineffective treatment systems must be used to maintain compliance and to carry out a minimal and time consuming cleanup. In some hydrogeologic settings, it is not practical to install pumping systems. Focus will be on the development of technologies and methods to locate and quantify Dense Non-Aqueous Phase Liquids sources, treat the contaminated groundwater and soils in situ to reduce cleanup mortgages while enabling cost effective cleanup. Virtually every field office site across the complex has need for improved analytical tools and in situ monitoring devices that eliminate the need to retrieve and transport samples. Dense Non-Aqueous Phase Liquid activities, including innovative characterization technologies, reactive barrier technologies, bioremediation, and in situ chemical destruction will be demonstrated in cooperation with other Federal agencies and in international initiatives. Significant efforts by private industry and the DOE National Laboratories will be aimed at contaminant characterization and delineation in the vadose zone and deep and complex geologic settings.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

In FY 2000, there are six distinct work elements which support this Product Line: 1.) Vadose and Saturated Zone Characterization, Monitoring, Modeling and Analysis; 2.) In Situ Passive and Reactive Systems; 3.) Advanced Bioremediation and Enhanced Natural Attenuation; 4.) Vadose Zone Chemical Treatment Targeted for Dense Non-Aqueous Phase Liquids; 5.) Saturated Zone Chemical Treatment Targeted for Dense Non-Aqueous Phase Liquids; 6.) Deep Subsurface Access and Placement for Dense Non-Aqueous Phase Liquids.

- Deploy Seismic Reflection technology at Savannah River for non-invasive location and characterization of free phase Dense Non-Aqueous Phase Liquids.
- Demonstrate Dense Non-Aqueous Phase Liquids location techniques in deep and fractured geologic settings.
- Continue development of vadose zone contaminant fate and transport models.
- Deploy Laser Induced Fluorescence, Alcohol Microinjection/Extraction, and Hydrophobic Flexible Membrane at Savannah River.
- Perform verification of Dense Non-Aqueous Phase Liquids Reactive Barrier.
- Deploy Bioremediation Treatment Technology System at the Idaho National Engineering and Environmental Laboratory.
- Continue development of Phytoremediation technologies with university and international partners.
- Deplov Electro-osmosis (Lasagna™) technology at Paducah, Kentucky.
- Deploy hydro fracturing technology to treat Dense Non-Aqueous Phase Liquids in clay at Portsmouth, Ohio.
- Complete side-by-side demonstration of Dense Non-Aqueous Phase Liquids remediation and characterization technologies with other Federal agencies at Cape Canaveral.
- Deploy Hydrous Pyrolysis technology at Portsmouth and Savannah River Site 321.
- Demonstrate In Well Air Stripping, (NOVocs™) at Brookhaven National Laboratory for offsite Dense Non-Aqueous Phase Liquids that have migrated off site.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue joint Environmental Protection Agency/Department of Defense/industry effort to demonstrate surfactant technology to enhance aquifer remediation.			
■ Assess post-treatment Dense Non-Aqueous Phase Liquids mobility at Savannah River.			
■ Deploy deep Dense Non-Aqueous Phase Liquids access and treatment delivery system at Oak Ridge.			
Dense Non-Aqueous Phase Liquid	12,722	15,002	18,829

Source Term Containment/Source Term Remediation

DOE continues to spend a large part of its resources on the monitoring and maintenance of leaking radioactive and mixed waste landfills to achieve compliance with regulatory requirements. In addition, DOE will not be able to remediate these landfills to appropriate standards due to the presence of hazardous materials. Landfill containment systems are currently being deployed across the DOE complex and nation. However, many of these cover systems which were built to current regulatory specifications are failing and will require costly repair or replacement. The development of improved verification and monitoring systems to evaluate both the construction and performance of barrier systems will improve barrier performance and reduce the life-cycle cost of containment. Currently, verification and monitoring systems exist only for newly constructed engineered landfills. Additionally, the emplacement of barriers at significant depths has not been accomplished. Current remediation actions do not utilize deep-placement technologies, often selecting more costly solutions. The demonstration of deep-placement barriers will improve alternatives and reduce costs. In addition, source term retrieval of DOE mixed waste has not been done. Therefore, better caps, covers and barriers are needed to prevent the migration of the unique DOE disposed wastes.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
A design manual for a risk based design life is required. Technologies also need to be developed to stabilize and/or retrieve hot spots with unusually high contamination levels so that they can be appropriately treated or disposed. These solutions will reduce the risk of contaminant migration in the environment, speed cleanup, and facilitate safer cleanup. All this serves to reduce risk to the public and site workers as well as reduce environment degradation.			
In FY 2000, there are four distinct work elements which support this Product Line: 1.) Subsurface Barrier Systems in the Vadose Zone; 2.) Stabilization of Contaminants in the Vadose Zone; 3.) Hot Spot Removal from Landfills and Subsurface Sources; and 4.) Waste Containment/Stabilization Verification and Monitoring.			
■ Demonstrate subsurface containment systems in support of the Richland vadose zone integration and Columbia River protection efforts at depths greater than 100 feet.			
■ Verify performance of in situ vitrification system using innovative bottom up approach at actual waste sites at Los Alamos National Laboratory.			
■ Deploy "Dig Face characterization" technology to delineate soil contamination at the Fernald Environmental Management Project.			
■ Deploy Segmented Gate Soil Processing technology at Mound.			
■ Continue long-term monitoring to develop performance specifications acceptable to regulatory agencies in multiple states. This will allow for multiple deployments.			
■ Deploy Evapotranspiration Cover/Integrated Fiber-Optic Performance Monitoring System at Albuquerque.			
■ Complete deployment of advanced landfill cover at the Nevada Test Site.			
■ Complete deployment and monitoring of phytoremediation stabilization of mixed waste plume at Argonne National Laboratory.			
■ Continue evaluation of alternative cap and cover material and develop risk based cover design manual.			
Source Term Containment/Source Term Remediation	9,778	6,604	5,372

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metals and Radionuclides in the Vadose and Saturated Zones

Metals and radionuclides contamination is present in the vadose and saturated zones at all DOE Operations Offices. Current technologies for the treatment of metals and radionuclides typically include excavation followed by ex situ treatment or pump-and-treat. These methods are costly, ineffective, and involve risk to workers. In addition, they are inadequate for attainment of the *Accelerating Cleanup: Paths to Closure* goals. Limited access to contaminants and low contaminant mobility at Albuquerque, Chicago, Oak Ridge, Rocky Flats, and Richland require reactive barrier technologies that remove or destroy radionuclide and hazardous metal contaminants moving in groundwater. To effectively address the existing site needs, solutions also must be developed that eliminate/reduce the volume of secondary waste and reduce workers' exposure. Partnerships with industry, the Environmental Protection Agency, the Department of Defense and other Federal agencies will lead to the cost effective development of in situ chemical treatment technologies that convert contaminants to less hazardous states and to the development of effective metal and radionuclide treatment/removal technologies based on bioremediation. In situ bioremediation technologies and improved drilling technology for sampling, delivery of treatment chemicals, or contaminant removal will be demonstrated. Existing access, sampling, and delivery methods cannot place characterization and treatment technologies in DOE's deep plumes. These plumes will be the most costly to remediate due to contaminant depth and geologic complexity. Improved technologies are needed to address these deep contaminants.

In FY 2000, there are six distinct work elements which support this Product Line: 1.) Vadose and Saturated Zone Characterization, Monitoring, Modeling and Analysis; 2.) In Situ Passive and Reactive Barrier Systems; 3.) Advanced Bioremediation and Enhanced Natural Attenuation; 4.) Vadose Zone Chemical Treatment Targeted for Metals and Radionuclides; 5.) Saturated Zone Chemical Treatment Targeted for Metals and Radionuclides; 6.) Deep Subsurface Access and Placement for Metals and Radionuclides.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue development of improved characterization and monitoring techniques.			
■ Continue development of vadose zone contaminant fate and transport models.			
■ Perform verification of Reactive Barrier Technology System at Rocky Flats. Deploy system at three to four other Rocky Flats Operable Units if performance is good.			
■ Perform verification of Reactive Barrier Technology System at Oak Ridge Y-12/S-3 Ponds.			
■ Perform verification of Iron Treatment Wall at Kansas City "Northeast Area" Plume.			
■ Perform verification of PERT Wall at Grand Junction, Monticello, Utah Uranium Mill Tailings Remedial Action Plume.			
■ Deploy monitored natural attenuation at a Brookhaven site for tritium treatment.			
■ Deploy phytoremediation at a site at Fernald and Idaho National Engineering and Environmental Laboratory.			
■ Develop strategies and technologies to monitor the natural attenuation processes.			
■ Deploy in situ Gaseous Reduction technology at Hanford.			
■ Continue development of in situ soil flushing technology for mobilization/extraction of radionuclides and hazardous metals.			
■ Deploy ACT*DE*CON at the Nevada Test Site.			
■ Deploy Chemical Stabilization technologies in Vadose Zone at Hanford in support of the vadose integration and Columbia River Protection efforts.			
■ Deploy in situ Redox Manipulation System for chromium treatment at Hanford.			
■ Demonstrate mixed metal/radionuclide treatment technology in complex hydro-geologic setting at Albuquerque. (Industry solicitation).			
Metals and Radionuclides in the Vadose and Saturated Zones ...	10,370	10,005	10,879
Total, Subsurface Contaminants Focus Area	32,870	31,611	35,080

Explanation of Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Dense Non-Aqueous Phase Liquids (Delineation, Removal or In Sit Treatment)	
■ Increase supports activities to develop, demonstrate and deploy technologies for the characterization and delineation of Dense Non-Aqueous Phase Liquids in the vadose zone and deep, complex geologic settings	3,827
Source Term Containment/Source Term Remediation	
■ Decrease primarily due to completion of multi-year activity performed in cooperation wit the Environmental Protection Agency to improve landfill caps, covers and barriers to prevent the migration of wastes from DOE sites	-1,232
Metals and Radionuclides in the Vadose and Saturated Zones	
■ Slight increase primarily related to technology development activities to characterize, monitor, and chemically treat contaminants in the vadose and saturated zones	874
Total Funding Change, Subsurface Contaminants Focus Area	3,469

Deactivation and Decommissioning Focus Area

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Deactivation and Decommissioning Focus Area is to provide technical capabilities and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated, technically defensible solutions for deactivation, decommissioning, and long-term stewardship of radioactively contaminated facilities at DOE sites.

Program Goal

The goal of the Deactivation and Decommissioning Focus Area is to efficiently and cost effectively develop, demonstrate and facilitate the implementation of safe/low risk systems to solve the EM program identified needs for acceptable deactivation and decommissioning of DOE's radioactively contaminated surplus facilities. The overall goal of the Focus Area is to reduce the estimated $12 billion deactivation and decommissioning mortgage as reported in the *Accelerating Cleanup: Paths to Closure* by 50 percent. Two-thirds of the estimated $12 billion in deactivation and decommissioning work is scheduled for post-2006. The Focus Areas' goal is to reduce the pre-2006 mortgage of approximately $4 billion by $1 billion and the post-2006 mortgage (nearly $8 billion) by $5 billion. Within the funding provided, this Focus Area will assist in the development of alternative technologies at individual sites and implement and maintain sound program management and integration processes to achieve the cost savings and risk reduction goals.

Program Objectives

The Deactivation and Decommissioning Focus Area objective is to use a Large-Scale Demonstration and Deployment Project approach. This approach focuses on specific, high priority deactivation and decommissioning projects identified by and co-funded with the facility's owner. The Large Scale Demonstration and Deployment Projects demonstrate innovative and improved deactivation and decommissioning technologies at full scale, side by side with existing baseline technologies. The intent is to compare benefits from using a suite of innovative deactivation and decommissioning technologies against those associated with baseline technologies. Primary drivers of this work are the reduction of risk to workers involved in the cleanups, and the recycle (where feasible) or reduction of the large amounts of waste generated from the deactivation and decommissioning activities.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 60 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by focus area, that will be demonstrated, made ready for implementation or deployed, is made available after Final FY 2000 project level funding is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are scheduled to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- Completed, in FY 1998, C-Reactor Interim Safe Storage project at Hanford. Hanford has already incorporated the results from the C-Reactor project into F- and DR-Reactor safe storage projects. It is estimated that the cumulative cost of safe storing all of DOE's production reactors will be less than full deactivation and decommissioning of one reactor.
- Complete, in FY 2000, a Large Scale Demonstration and Deployment Project initiated in FY 1998 to deactivate and decontaminate a tritium production facility at Mound. This large Scale Demonstration and Deployment Project will showcase 8-12 innovative technologies for remote characterization and decontamination and dismantlement of tritium-contained equipment and surfaces.
- Deploy, in FY 2000, in fuel pools at Hanford and Idaho, underwater visual inspection, characterization, and remote dismantlement technologies to reduce safety and exposure risk to workers in high radiation environments.
- Deploy, in FY 2000, technologies to rapidly characterize and separate contaminated and non-contaminated metals at Oak Ridge, Rocky Flats, Los Alamos National Laboratory, and potentially other DOE sites to reduce waste disposal costs.
- Develop and demonstrate, in FY 2000, real-time characterization and robotic dismantlement technologies to reduce worker risk in the highly radioactive and confined areas associated with fuel fabrication facilities at Hanford.
- In FY 2000, increased program emphasis will be on recycle and release of scrap metal and technologies for the deactivation and decommissioning of reprocessing and weapons components fabrication facilities.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Reactor Facilities	6,637	6,460	4,733	-1,727	-26.7%
Radionuclide Separation Facilities	10,893	5,145	6,525	1,380	26.8%
Fuel and Weapons Component Fabrication Facilities	2,152	5,382	5,854	472	8.8%
Laboratory Facilities	9,784	5,951	0	-5,951	-100.0%
Total, Deactivation and Decommissioning Focus Area	29,466	22,938	17,112	-5,826	-25.4%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Reactor Facilities

There are 14 surplus production reactors across the DOE weapons complex which represent a significant portion of the Department's long-term deactivation and decommissioning mortgage. Improved, innovative technologies are required to facilitate deactivation and decommissioning of these production reactors to a degree such that they can be put in interim safe storage for a long period of time (up to 50 years) with minimal surveillance and maintenance requirements.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Technologies will be demonstrated and deployed which address underwater visual inspection, characterization and dismantlement as well as removal and treatment of fuel pool sludges, debris and water. These improved/innovative technologies will reduce the worker risk in high radiation fuel pools and significantly reduce the cost of deactivation and decommissioning of such facilities. Technologies demonstrated should substantially assist the future deactivation of the K-basin at Richland, as well as assist the commercial nuclear utility industry which also faces deactivation and decommissioning of similar complex facilities. For this reason, the commercial nuclear utility industry will be a key participant and be directly involved in this effort. Without these technologies, DOE sites and private industry will have no alternative but to adhere to their original technical baselines which will incur high cost, unacceptable worker risk, and long project duration to complete deactivation and decommissioning of these facilities.			
In FY 2000, there is one distinct work element which supports this Product Line: 1.) Deactivation and Decommissioning of Fuel Pools and Associated Structures.			
■ Demonstrate and deploy underwater visual inspection and characterization technologies at Hanford K-Basin			
■ Demonstrate and deploy underwater remote dismantlement technologies.			
■ Demonstrate and deploy technologies using controlled explosion for dismantlement of massive structures.			
Reactor Facilities	6,637	6,460	4,733
Radionuclide Separation Facilities			
Improved, innovative technologies are required to deactivate and decommission radionuclide separation facilities, including gaseous diffusion plants, fuel reprocessing canyons and a wide variety of specific types of facilities (such as chemical separation, uranium recycling, lithium enrichment, heavy water production and tritium production).			

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Deactivation and decommissioning activities can enable recovery of valuable contaminated scrap metal. At present, most of these metals are disposed of as no technologies exist to characterize and/or decontaminate them for free release cost-effectively. Decontamination of metals for recycle for free release will result in substantial life-cycle costs savings. Technologies to characterize, separate (contaminated and non-contaminated portions), and decontaminate metals for internal DOE recycle or free release will be demonstrated and deployed. Without this effort, most of the metals generated during deactivation and decommissioning will be disposed of as low-level waste resulting in high life-cycle cost.

Processing facilities are typically massive in size, are aging structures, and have high levels of contamination. These facilities have been used to process materials and treat waste containing plutonium, uranium, and various hazardous materials. Removal and disposition of radioactive and hazardous materials and equipment, deactivation of non-essential systems and utilities, and reconfiguration of systems to facilitate long-term surveillance and maintenance within these facilities with baseline technologies are very costly and pose high safety and health risks for workers and the public. Technologies will be demonstrated and deployed which address characterization of specific contaminants, accomplish large-scale decontamination and dismantlement, and waste disposition, enhance worker safety, and utilize remote operations.

In FY 2000, there are two distinct work elements which support this Product Line: 1.) Scrap Metal Recycling and Release; and 2.) Deactivation and Decommissioning of Processing Facilities.

- Demonstrate and deploy technologies to rapidly characterize and separate contaminated and non-contaminated metals at Oak Ridge.
- Demonstrate and deploy melting technology for producing clean ingots of stainless steel and nickel from contaminated feed at Oak Ridge.
- Develop and demonstrate real-time characterization technologies at Los Alamos National Laboratory and Rocky Flats.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Develop and demonstrate robotic dismantlement technologies for process equipment at Rocky Flats.			
Radionuclide Separation Facilities	10,893	5,145	6,525

Fuel and Weapons Component Fabrication Facilities

Improved and innovative technologies are required to deactivate and decommission fuel and weapons component fabrication facilities including those used for uranium milling and refining, fuel and target fabrication, and weapons assembly, dismantlement, modification and maintenance. Cost and risk of using baseline technologies for deactivation and decommissioning of these facilities is staggering. Improved, innovative technologies will be demonstrated and deployed which address the cost effective characterization, decontamination and dismantlement of such facilities.

DOE's Mound facility has many structures which contain tritium contamination. Improved and innovative technologies will be demonstrated and deployed to address building decontamination/dismantlement and metal/concrete waste disposal/recycling. Without these technologies, the Mound facility and other DOE sites will be forced to adhere to original technical baseline that will increase the risk to workers and increase the cost and time needed for deactivation and decommissioning.

In FY 2000, there are two distinct work elements which support this Product Line: 1.) Deactivation and Decommissioning of Tritium Contaminated Facilities; and 2.) Deactivation and Decommissioning of Weapons Components Fabrication Facilities.

- Demonstrate and deploy tritiated pump oil disposition technology.
- Demonstrate and deploy dust suppression technology.
- Demonstrate and deploy tritiated glovebox decontamination technology at Mound.
- Develop and demonstrate remotely deployed real-time characterization technologies at Hanford.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Develop and demonstrate remote decontamination technologies at Hanford.			
Fuel and Weapons Component Fabrication Facilities	2,152	5,382	5,854
Laboratory Facilities			
Innovative and improved technologies are required to deactivate and decommission laboratory facilities including research, development and testing facilities, hot cells and gloveboxes.			
Across the DOE weapons complex, there is a large number of surplus plutonium contaminated gloveboxes. Technologies for characterization of contaminated surfaces to determine transuranic, low-level waste or free-release segregation and packaging of transuranic contaminated waste will be demonstrated and deployed. This will minimize the amount of glovebox material requiring disposal as transuranic waste.			
■ This activity will not be continued into FY 2000.			
Laboratory Facilities	9,784	5,951	0
Total, Deactivation and Decommissioning Focus Area	29,466	22,938	17,112

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Reactor Facilities	
■ Continue, at a reduced level technology development efforts related to inspection, characterization, and dismantlement needs associated with fuel pools and other structures	-1,727
Radionuclide Separation Facilities	
■ Increase supports efforts to develop, demonstrate and deploy technologies to characterize and separate contaminated and non-contaminated metals and develop and demonstrate robotic dismantlement technologies for process equipment	1,380

	FY 2000 vs FY 1999 ($000)
Fuel and Weapons Component Fabrication Facilities	
■ Increase supports activities to develop, demonstrate and deploy improved characterization, decontamination and dismantlement technologies required for cleanup of the Department's fuel weapons component fabrication facilities. (+$560); Increase offset by slight decrease related to planned completion in FY 2000 of Large Scale Demonstration and Deployment Project to deactivate and decontamination a tritium production facility at Mound. (-$88)	472
Laboratory Facilities	
■ Decrease due to discontinuation, in FY 2000, of characterization and decontamination technology development activities related to transuranic contaminated materials and waste disposition	-5,951
Total Funding Change, Deactivation and Decommissioning Focus Area	-5,826

Plutonium Stabilization and Disposition Focus Area

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Plutonium Stabilization and Disposition Focus Area is to provide technical capabilities and deployment assistance, in partnership with other Environmental Management programs, to provide fully integrated, technically defensible solutions for cleanup and long-term stewardship of plutonium materials and residues at DOE sites.

Program Goal

The Secretary of Energy has made commitments to the Defense Nuclear Facility Safety Board in response to Defense Nuclear Facility Safety Board Recommendation 94-1 that the Department will develop and deploy technologies to stabilize and dispose of plutonium and plutonium residues. More than 20 tons of plutonium and 170 tons of plutonium residues remain in the weapons manufacturing "pipeline" at several DOE sites such as Rocky Flats, Hanford, and Savannah River. Plutonium and plutonium residues will continue to pose imminent environmental, safety, and health hazards until they are incorporated into stable, safeguards-compatible waste forms and final disposition is completed. Similar quantities of unstabilized material exist in the former Soviet Union. The goal of the Plutonium Stabilization and Disposition Focus Area is to develop appropriate stabilization and waste treatment technologies, devise packaging, and support development of necessary transportation, storage, surveillance, and monitoring technologies. Within the funding provided, this Focus Area will assist in the deployment of alternative technologies at individual sites and implement and maintain sound program management and integration processes.

Program Objectives

Continue to develop technologies that address the stabilization and disposition of plutonium and plutonium residues across the complex. Deploy stabilization and disposition technologies as rapidly as possible to meed Defense Nuclear Facilities Safety Board 94-1 requirements and to support *Accelerating Cleanup: Paths to Closure* goals.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 60 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by Focus Area, that will be demonstrated, made ready for implementation or deployed, is made available after final FY 2000 project level funding is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are scheduled to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- Complete, in FY 1999, development of nonintrusive, automated surveillance and monitoring technologies.
- Demonstrate, in FY 2000, Phosphate-bonded cold ceramic technology at Rocky Flats to stabilize plutonium ash residue, a Defense Nuclear Facilities Safety Board identified concern.
- Test, in FY 2000, porous crystalline matrix technology to stabilize actinide solutions including plutonium, americium, and curium solutions at Savannah River F-Canyon.
- In FY 2000, program emphasis will be on development of stabilization technologies needed to address problems at Rocky Flats and Savannah River.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Plutonium Stabilization Technology Development	0	3,893	3,653	-240	-6.2%
Alternative Stabilization Process for Fissile Materials Solutions	0	0	600	600	100.0%
Alternate Packaging and Storage Technologies	0	1,587	0	-1,587	-100.0%
Total, Plutonium Stabilization and Disposition Focus Area	0	5,480	4,253	-1,227	-22.4%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Plutonium Stabilization Technology Development			
Stabilization process development applies to plutonium and Defense Nuclear Facility Safety Board 94-1 materials (plutonium solutions, plutonium metals and oxides, plutonium residues, highly enriched uranium, and special isotopes) that require stabilization before being placed in interim storage to await ultimate disposition. The complexity of the at-risk Defense Nuclear Facility Safety Board 94-1 plutonium inventory and the variety of physical forms (such as oxides, salts, ash and solutions) creates need for additional research and development.			
Plutonium residue stabilization is a critical path item at Rocky Flats. Accelerated cleanup goals and innovative technologies are needed to meet cleanup schedule. High-efficiency particulate air filters containing plutonium are a problem since incineration and leaching approaches are unacceptable. Technologies will be demonstrated and deployed which address high-efficiency particulate air filters, Uranium-233 Stabilization, Uranium-235 Stabilization and salt distillation at Rocky Flats. The impact if these technologies are not developed and implemented would be an increased risk to health, safety and the environment.			
In FY 2000, one distinct work element supports this Product Line: 1.) Plutonium Ash and Filter Stabilization.			
■ Deploy in collaboration with Office of Science and Technology Robotics program, Phosphate – Bonded Cold Ceramic technology at Rocky Flats to stabilize 20 tons of ash residue.			
■ Full Scale demonstration of melting fiberglass filters at low temperature in a glass flux to evaluate acceptability as a stabilization process.			
Plutonium Stabilization Technology Development	0	3,893	3,653

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

Alternative Stabilization Process for Fissile Materials Solutions

An alternative technology to vitrification is needed to address the problem of liquids containing americium and curium that produces reduced secondary waste, and that is reliable and cost effective. The new technology must reduce risk to safety, health, and environment.

Approximately 15,000 liters of solution containing isotopes of Americium and Curium are stored at the Savannah River Site in F-Canyon Tank 17-1. The original intent was to immobilize the Americium/Curium solution by vitrification in a bushing melter commencing in September 1998. Initial failures of the melter pushed the stabilization process into early FY 2000. Technical issues with the melter concerning plugging and off-gas caused all research and development efforts to be placed on hold. A technology, recently developed in Russia which would use a porous crystalline matrix, is being investigated which absorbs liquids at room temperature, forming stable ceramic material, suitable for safe long-term storage and transportation. If this technology is not pursued as a potential primary stabilization process, and as an alternative to precipitation-vitrification option, the Americium/Curium solution would remain unstabilized and the current risk to safety, health and the environment will remain or potentially increase.

In FY 2000, one work element supports this Product Line: 1.) Americum and Curium Removal and Stabilization from F Canyon.

- Test waste solutions containing actinide including plutonium, americium, and curium.
- Support Savannah River Site testing using small scale of actual Americium/Curium solution.
- Support Savannah River Site in scale-up tests with actual Americium/Curium solution.

Alternative Stabilization Process for Fissile Material Solutions . .	0	0	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Alternate Packaging and Storage Technologies			
Plutonium and other actinides are currently stored in various packages, tanks, piping, plastic containers, and metal containers. When production was terminated in 1989-1993, these materials were typically being held for staging into production processes. DOE-STD-3013 requires plutonium metals and oxides to be stored in dry atmospheres in hermetically sealed containers not containing organic materials. Surveillance of packages is required to ensure that container integrity is maintained and that all materials comply with environmental, safety, health, accountability, and control requirements. Surveillance and monitoring processes need to be standardized complex-wide. Nonintrusive surveillance methods are needed to minimize radiation exposure and cost associated with conventional methods (such as inspection by opening packages).			
■ Technologies related to nonintrusive, automated surveillance and monitoring technology development will be completed in FY 1999.			
Alternate Packaging and Storage Technologies	0	1,587	0
Total, Plutonium Stabilization and Disposition Focus Area	0	5,480	4,253

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Plutonium Stabilization Technology Development	
■ Continue, at a reduced level, stabilization technology development activities	-240
Alternative Stabilization Process for Fissile Materials Solutions	
■ Increase supports initiation of testing of porous crystalline matrix technology to stabilize actinide solutions including plutonium, americium and curium solutions at Savannah River F-Canyon	600
Alternate Packaging and Storage Technologies	
■ Decrease reflects completion, in FY 1999, of automated surveillance and monitoring technology development activities	-1,587
Total Funding Changes, Plutonium Stabilization and Disposition Focus Area	-1,227

University Programs

Mission Supporting Goals, and Objectives

Program Mission

The mission of University Programs is to support the Focus Areas by providing fundamental credible data related to the application of technologies, resolution of technical issues and system optimization.

Program Goal

The goal of University Programs is to support the Focus Areas through the involvement of the academic community in the development of credible data from non-conflicted, recognized experts in support of activities related to the acceptance of innovative technologies by the regulators and stakeholders.

Program Objectives

The objective of University Programs is to evaluate technologies, validate their applications, and assist in the resolution of technical issues in support of the Focus Area.

Performance Measures

The Science and Technology FY 2000 corporate performance metrics (30 technologies or technology systems demonstrated; 30 technologies or technology systems made available for implementation; 61 alternative technologies deployed) are set at the Project Baseline Summary level, based on past program performance and budget requested. The complete listing of specific technologies, by Focus Area, that will be demonstrated, made ready for implementation or deployed, is made available after final FY 2000 project level funding is known and FY 2000 annual performance plans are finalized by each Focus Area. FY 2000 annual performance plans are scheduled to be finalized by September 30, 1999.

Significant Accomplishments and Program Shifts

- Continue, in FY 2000, research in support of robotic technologies supporting the Mixed Waste Focus Area to allow autonomous glovebox material processing, material handling, volume reduction of gloveboxes and automated handling of shipping drums.
- Continue, in FY 2000, research in support of the Subsurface Contaminants Focus Area to remove metals from soils using advanced phytoremediation technologies.

- Continue, in FY 2000, research in support of the waste loading/glass formulation, alternative melter design, analytical high-level/low level waste glass standards, and long-term performance for the Radioactive Tank Remediation Focus Area.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Florida State University	1,600	2,215	1,900	-315	-14.2%
Mississippi State University	5,572	4,500	4,000	-500	-11.1%
Florida International University	5,000	5,000	5,000	0	>999.9%
Medical University of South Carolina	3,000	0	0	0	>999.9%
Tulane University	2,433	0	0	0	>999.9%
Robotics University Program	4,000	4,000	4,000	0	>999.9%
Electronics Recovery Recycle	0	2,000	0	-2,000	-100.0%
Mixed Waste/Subsurface Contaminants	0	1,500	0	-1,500	-100.0%
Total, University Programs	21,605	19,215	14,900	-4,315	-22.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Florida State University			
Facilitate partnerships with Eastern and Central European Institutes for the evaluation and transfer of European environmental technologies for application to DOE problems.			
■ Conduct research to remove metals from soils using advanced phytoremediation technologies.			
■ Conduct joint technology development with Russian and Central European organizations, support marketing of United States technologies throughout Central and Eastern Europe, and bring foreign technologies to the United States environmental cleanup effort.			
Florida State University	1,600	2,215	1,900
Mississippi State University			
Continue support to the Mixed Waste Characterization, Treatment, and Disposal, the Deactivation and Decommissioning, and the Radioactive Tank Waste Remediation Focus Areas.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conduct applied research and development that will lead to new technologies and techniques to deactivate and/or decommission facilities currently deferred until after 2006.			
■ Support development of robotic technologies to deactivate and decommission facilities such as Hanford Canyons and plutonium processing facilities.			
■ Support development of robotic technologies to allow autonomous glovebox material processing.			
■ Support development of robotic technologies for material handling, volume reduction of gloveboxes, and automated handling of shipping drums.			
Mississippi State University	5,572	4,500	4,000
Florida International University			
Continue to support the Deactivation and Decommissioning, Mixed Waste Characterization, Treatment and Disposal, and the Radioactive Tank Waste Remediation Focus Areas.			
■ Conduct applied research and development that will lead to new technologies and techniques to deactivate and/or decommission facilities currently deferred until after 2006.			
■ Conduct research in support of waste loading/glass formulation, alternative melter design, analytical high-level/low-level waste glass standards, and long-term performance test methods.			
■ Conduct research in support of development of sludge mapping tools, high-level waste process monitors, advanced calcination, dissolution process for calcined waste, integrated chlorinated solvents, transuranic waste, and strontium solvent extraction process, spherical inorganic sorbents, electrochemical caustic recovery, and salt splitting of radioactive waste.			
■ Conduct joint technology development with Latin American countries, support marketing of United States' technologies throughout Latin America, and bring foreign technologies to the United States environmental cleanup effort.			
Florida International University	5,000	5,000	5,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Medical University of South Carolina			
Conduct research focusing on recognition, identification, mechanisms, quantification and prevention of adverse biological effect/human disease resulting from exposure to chemical agents in the environment.			
■ This grant will be funded elsewhere in the Defense Environmental Restoration and Waste Management appropriation.			
Medical University of South Carolina	3,000	0	0
Tulane University			
Support activities to provide tools for technology evaluation to maximize assessment and management of risk reduction activities in the weapons complex. Support the Subsurface Contaminants Focus Area through the evaluations of the health of contaminated aquatic environments in the Mississippi River Basin.			
■ This grant was completed in FY 1998			
Tulane University	2,433	0	0
Robotics University Program			
Consortium of Universities: Florida, Tennessee, New Mexico, Michigan and Texas that provide broad capabilities ranging from "basic" through "applied" research in support of specific projects across the DOE complex.			
■ Support the development of robotic technologies and techniques to deactivate and/or decommission facilities currently deferred until after 2006.			
■ Support the development of robotic technologies to verify and prepare drummed waste for transfer to Waste Isolation Pilot Plant and technologies for segregation of transuranic and low-level waste.			
■ Support the development of non-destructive examination end-effectors for tank closure and restricted access equipment for waste mobilization and transfer.			
Robotics University Program	4,000	4,000	4,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Electronics Recovery Recycle			
In accordance with report language contained in the FY 1999 Conference Report to the Energy and Water Development appropriation, supports a consortium of private sector entities and the University of West Virginia that provides broad capabilities ranging from basic through applied research and development in areas related to the recycle and reuse of glass, metals, and plastics electronic components.			
■ Activity will not be continued in FY 2000.			
Electronics Recovery Recycle	0	2,000	0
Mixed Waste/Subsurface Contaminants			
Supports activities to provide tools for the evaluation of innovative technologies, and limited technology development, that supports cleanup activities in the Mixed Waste and Subsurface Contaminants Focus Areas. Performer has not yet been selected.			
■ Activity will not be continued in FY 2000.			
Mixed Waste/Subsurface Contaminants	0	1,500	0
Total, University Programs	21,605	19,215	14,900

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Florida State University	
■ Continue facilitation activities, at a slightly reduced level, with Eastern and Central European Institutes for the evaluation and transfer of European environmental technologies for application to DOE problems	-315
Mississippi State University	
■ Continue, at a slightly reduced level, deactivation, decommissioning, robotic material handling, and automated handling of shipping drums activities	-500
Florida International University	
■ No change	0

	FY 2000 vs FY 1999 ($000)
Medical University of South Carolina	
■ No change	0
Tulane University	
■ No change	0
Robotics University Program	
■ No change	0
Electronics Recovery Recycle	
■ Activities that support research and development related to recycle and reuse of glass, metals and plastic electronic components will not be continued in FY 2000	-2,000
Mixed Waste/Subsurface Contaminants	
■ Activities to provide tools for the evaluation of innovative technologies to support cleanup activities in the Mixed Waste and Subsurface Contaminants Focus Areas will not be continued in FY 2000	-1,500
Total Funding Change, University Programs	-4,315

Idaho Technology Validation and Verification Program

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Idaho Technology Validation and Verification Program is to support the Focus Areas and the Environmental Management program through technology validation and verification activities that support and enhance application and deployment of innovative EM technologies across the DOE complex and systems engineering activities which will be used in the development of disposition processes for each EM waste stream. These activities will place DOE's environmental programs on a solid technical base, reduce costs, and leverage the DOE investment into broader national environmental priorities.

Program Goal

The goal of the Idaho Technology Validation and Verification Program is to provide the Focus Areas and Environmental Management program processes that will assist EM in focusing activities on accelerating cleanup; investigating alternatives to the identified baseline using innovative technologies; and tracking performance of these efforts.

Program Objectives

The primary objective of the Idaho Technology Validation and Verification Program is to support EM in identifying and analyzing complex-wide integration opportunities to reduce program costs and risks.

Performance Measures

No quantifiable corporate performance measures are associated with this program.

Significant Accomplishments and Program Shifts

- Continue, in FY 2000, systems engineering support for assessment and validation of EM systems and technology performance reliability/risk.

- Continue, in FY 2000, research activities to support EM missions identified from disposition maps priority needs, including research in materials and structural dynamics; materials characterizations science; environmental surface chemistry; containment transport through soils; liquid media and the atmosphere; and mathematical and computational modeling of complex environmental systems.
- Continue, in FY 2000, identification of disposition barrier to technology development requirements, and transportation system requirements to support disposition of EM waste, spent nuclear fuel, and nuclear materials.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Validation and Verification	14,500	5,500	14,500	9,000	163.6%
Systems Engineering	0	8,000	8,000	0	>999.9%
Total, Idaho Technology Validation and Verification Program	14,500	13,500	22,500	9,000	66.7%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Validation and Verification

Technology validation and verification activities will be used to support and enhance application and deployment of innovative technologies across the DOE complex and to provide a solid technical base for EM cleanup, reduce costs and leverage the DOE investment into broader national environmental priorities.

- Continue coordination of research activities with EM Integration and Focus Areas and interface with Site Technology Coordinating Groups to maintain and update data on specific science and technology needs.
- Execution of selected research activities to support EM mission extrapolated from disposition maps priority needs. Activities will include research in materials and structured dynamics; materials characterization science; environmental surface chemistry; containment transport through soils, liquid media, and the atmosphere; and mathematical and computational modeling of complex environmental systems.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue development of integrated, multidisciplinary technical research teams focused on environmentally related research and development including materials and structured dynamics; materials characterization science; environmental surface chemistry; containment transport through soils, liquid media, and the atmosphere; and mathematical and computational modeling of complex environmental systems.			
■ Systems engineering support for application and extension of capabilities for assessment and validation of EM systems and technologies performance reliability/risk, and for facilitation of regulatory and stakeholder acceptance in support of deployment and life-cycle assurance.			
■ Rapid deployment of scientific, technical and system engineering response teams to address national/complex-wide issues (for example, the vadose zone at Richland).			
Validation and Verification	14,500	5,500	14,500

Systems Engineering

Systems Engineering activities will be used in the refinement of EM waste, spent nuclear fuel, and nuclear materials disposition baselines, and identify and implement new opportunities to accomplish more efficient and cost effective cleanup/closure of DOE sites. Systems engineering activities provide the information and communication tools necessary to maximize the use of existing facilities, share technical information, minimize duplication, promote cost savings, and utilize a systems approach to facilitate accelerated cleanup while reducing closure costs and risks. Utilization of systems engineering processes brings together EM waste, spent nuclear fuel, and nuclear materials management, site cleanup, transportation, and Science and Technology activities. EM integration cuts across program and site "stovepipes", interfaces with other Departmental programs, and evaluates cross-site and cross-program opportunities for efficiencies and cost reductions to streamline and implement accelerated cleanup.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The EM Integration activity utilizes multi-site teams to develop, evaluate, and recommend alternatives to existing waste, spent nuclear fuel, and nuclear materials disposition baselines. DOE and contractor management personnel and subject matter experts from DOE EM sites are represented during the integration process. These activities are fundamental to the EM integration effort to establish and communicate a credible waste, spent nuclear fuel, and nuclear materials disposition baseline, and identify, evaluate, and implement selected efficiency opportunities. ■ Continue support to DOE-HQ, Field Offices, and contractors in development and integration of EM waste, spent nuclear fuel, and nuclear material disposition baselines. ■ Continue identification of barriers to disposition, technology development requirements, and transportation system requirements to support disposition of EM waste, spent nuclear fuel, and nuclear materials. ■ Identify cross-site and cross-program integration opportunities. ■ Perform technology development alternative analyses for integration opportunities. ■ Continue deployment of Integrated Product Teams to prepare Recommendation Evaluation Plans for selected waste, spent nuclear fuel, nuclear materials, technology development, and transportation opportunities for subsequent incorporation into project baselines.			
Systems Engineering	0	8,000	8,000
Total, Idaho Technology Validation and Verification Program	14,500	13,500	22,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Validation and Verification	
■ In FY 1999, $9,000,000 is included for the Idaho Technology Validation and Verification Program within the Idaho Site Project Completion decision unit under the Defense Environmental Restoration and Waste Management appropriation account for a total of $22;500,000. Beginning in FY 2000, the funding request for this activity will be consolidated under the Science and Technology decision unit. There is no overall funding level change for this activity from FY 1999 to FY 2000	-9,000
Systems Engineering	
■ See above explanation	0
Total Funding Change, Idaho Technology Validation and Verification Program	-9,000

Western Environmental Technology Office

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Western Environmental Technology Office is to support the Mixed Waste Characterization, Treatment and Disposal Focus Area and the Subsurface Contaminants Focus Areas. For more than two decades, DOE has used the Western Environmental Technology Office as a test facility, where MSE Technology Applications, Inc. engaged in the research, testing, demonstration, development, and application of innovative technologies. In FY 1996, agreements were reached to privatize the Western Environmental Technology Office facility with a 5-year contract through 2001. Privatization will fulfill DOE's financial and management obligations and reduce the Government's costs in contracting services.

Program Goal

The goal of the Western Environmental Technology Office is to focus on testing technologies meeting high priority EM cleanup needs associated with the Mixed Waste Characterization, Treatment and Disposal Focus Area and the Subsurface Contaminants Focus Areas.

Program Objectives

The objective of the Western Environmental Technology Office is to support the Mixed Waste Characterization, Treatment and Disposal Focus Area and the Subsurface Contaminants Focus Area through the demonstration, testing, and evaluation of selected technology systems, performing life-cycle engineering analyses on innovative technology systems to maximize the chances of successful implementation and deployment.

Performance Measures

This program supports the Mixed Waste and Subsurface Contaminants Focus Area. As such, no quantifiable corporate performance measures are associated with this program.

Significant Accomplishments and Program Shifts

- Complete, in FY 2000, evaluation of off gas control and emission monitoring technologies as identified by the Mixed Waste Characterization, Treatment and Disposal Focus Area and the end users at Idaho, Oak Ridge, and Savannah River.
- Complete, in FY 2000, final documentation of the "as-built" performance for deployment of several of the radionuclide contaminated sites and continue monitoring and technical support for the barrier system applications throughout the DOE complex.
- Complete, in FY 2000, verification and documentation of in situ destruction techniques for Dense Non-Aqueous Phase Liquids demonstration at Cape Canaveral and initiate technology transfer performed with consortium (DOE, Department of Defense, United States Air Force, Environmental Protection Agency).
- Continue, in FY 2000, validation of cost savings estimates, including uncertainty analysis for deployed technologies across DOE complex.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Controlled Emissions Demonstration	4,600	3,500	3,500	0	>999.9%
Subsurface Contaminant and In Situ Remediation	7,495	7,250	4,300	-2,950	-40.7%
Engineering Analysis	1,298	2,250	2,704	454	20.2%
Total, Western Environmental Technology Office	13,393	13,000	10,504	-2,496	-19.2%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Controlled Emissions Demonstration

By 2002, the four operational DOE hazardous waste thermal treatment units must be able to meet the Environmental Protection Agency Maximum Achievable Control Technology Rule or be shut down. The Maximum Achievable Control Technology Rule states that a compliance plan must be submitted to the Environmental Protection Agency for covered operations within 180 days of promulgation of the rule (January 1999). Noncompliance with the Maximum Achievable Control Technology Rule will threaten DOE's ability to meet compliance agreements.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Promising, technologically mature off gas monitoring and treatment systems, which are being tested under the Controlled Emissions Demonstration Project at Western Environmental Technology Office for organic and inorganic hazardous air pollutants should address this challenge of emission compliance by 2002.			
■ Complete evaluation of off gas control and emission monitoring technologies as identified by the Mixed Waste Characterization, Treatment and Disposal Focus Area and the end users at the Idaho National Environmental Technology (New Waste Calcination Facility and the Waste Experimental Reduction Facility), Oak Ridge National Laboratory (Toxic Substances Control Act Incinerator) and the Savannah River Site (Consolidated Incineration Facility). Needs have been identified for furan/dioxin and volatile metals including mercury. Benefits include a design basis to support improved off gas systems and a flexible test bed readily available at Western Environmental Technology Office for continued off gas technology testing.			
Controlled Emissions Demonstration	4,600	3,500	3,500
Subsurface Contaminant and In Situ Remediation			
Activities will support the Subsurface Contaminants Focus Area in addressing the problems/needs identified in the following areas: subsurface barrier systems, vadose zone stabilization, in situ passive treatment, deep access and delivery methods, containment/stabilization verification and monitoring. This investment directly supports Subsurface Contaminants Focus Area in its efforts to help meet all DOE Operation Offices' requirements, schedules and *Accelerating Cleanup: Paths to Closure* goals while directly contributing to cost reduction, schedule compression and risk minimization.			
■ Complete the final documentation of the as-built viscous liquid barrier of the radionuclide contaminated site deployment; continue monitoring and provide technical support for barrier system applications throughout the DOE complex.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete verification and documentation of in situ destruction techniques for Dense Non-Aqueous Phase Liquids demonstration at Cape Canaveral and initiate technology transfer performed with consortium (DOE, Department of Defense, United States Air Force, Environmental Protection Agency).			
■ Complete deployment of an alternative in situ vitrification system, verification, and documentation. Provide assistance in transferring this technology to more complex sites including those with containerized buried waste, organics, shallow groundwater and other technically challenging environments.			
■ Complete methodology for rapid barrier construction performance evaluation and support its use throughout the complex.			
■ Complete demonstration, validation and documentation of ultra microbacteria barrier and one or more deep (greater than 50 feet) treatment systems.			
■ Complete demonstration, validation and documentation of reactive media for barriers and deep placement. Deploy media to projects using in situ passive treatment technologies.			
Subsurface Contaminant and In Situ Remediation	7,495	7,250	4,300

Engineering Analysis

Technical assistance and life-cycle systems analysis is critically important to achieving the successful deployment of treatment, remediation, and containment technology systems. These activities will focus on the analysis of technology systems which are ready candidates for implementation and deployment, matching newly developed technologies with DOE urgent cleanup needs to enhance deployment opportunities, and providing technical assistance to developers and users to assure successful deployment. Thus, this program will emphasize moving DOE funded technologies into the commercial setting either within the DOE complex or in private industry and accelerating innovative DOE technology acceptance at the local and regional level.

- Provide independent innovative technology cost savings analysis for the Office of Science and Technology.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Provide Focus Areas with 10 (minimum) analyses of innovative technologies.			
■ Validate cost savings estimates, including uncertainty analysis for deployed technologies across EM complex.			
■ Report on status of MSE Technology Applications, Inc., evaluated technologies to deploy and commercialize. To include, but not limited to dioxin/furan and mercury off gas treatment and emission monitoring systems, reactive and containment barriers, barrier verification and monitoring systems, Dense Non-Aqueous Phase Liquids in situ treatment systems and alternative in situ vitrification.			
Engineering Analysis	1,298	2,250	2,704
Total, Western Environmental Technology Office	13,393	13,000	10,504

Explanation of Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Controlled Emissions Demonstration	
■ No change	0
Subsurface Contaminant and In Situ Remediation	
■ Decrease related to the completion, in FY 2000, of several activities, such as: 1) final verification and documentation of in situ destruction techniques for Dense Non-Aqueous Phase Liquids demonstration at Cape Canaveral; complete deployment, verification and documentation of an alternative in situ vitrification system; complete final documentation of the as-built viscous liquid barrier of the radionuclide contaminated site deployment; and complete demonstration, validation and documentation of ultra microbacteria barrier and reactive media for barriers and deep placement	-2,950
Engineering Analysis	
■ Increase supports technology cost savings analysis activities and selected innovative technology evaluation efforts	454
Total Funding Change, Western Environmental Technology Office	-2,496

Technology Acceptance and Support

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Technology Acceptance and Support program is to provide business support to the Office of Science and Technology and to stimulate wider acceptance and deployment of emerging technologies for use in fully integrated, technically defensible solutions for cleanup and stewardship of DOE sites.

Program Goal

The goal of the Technology Acceptance and Support program is two-fold. First, the program is to provide the Office of Science and Technology with sound business assistance and effective information management. Second, the program is to facilitate wider acceptance and deployment of Focus Area technologies by timely analysis and provision of technology information to user sites and other stakeholders; as well as by activities that improve technical quality, responsiveness to site needs, and regulatory acceptance of Office of Science and Technology products, and leveraging of international science and technical expertise.

Program Objectives

The Technology Acceptance and Support program objectives are to provide effective business management controls and practices; technology and overall program information collection, analysis, and dissemination; program and peer reviews of technology initiatives; clarification of site science and technology needs and responsive Focus Area activities and technologies; facilitation of rapid technology deployment; support to interstate regulatory cooperation initiatives for the use of innovative technologies; facilitation of international science and technology cooperation; and recommendations for enhancing technology worker safety.

Performance Measures

No quantifiable corporate performance measures are associated with this program.

Significant Accomplishments and Program Shifts

- Continue, in FY 2000, to maintain information through the Technology Management System and other communication tools to aid in overall Office of Science and Technology business and program management and articulation.
- Update and continue, in FY 2000, life-cycle impact estimates for innovative technologies, with emphases on potential cost savings, using the EM standardized methodology which was developed under this program.
- Continue, in FY 2000, conducting independent reviews of Office of Science and Technology programs and significant processes and provide peer reviews of Office of Science and Technology technologies. In FY 1998 and FY 1999, over 70 technologies will have been peer reviewed under the methodology established in late FY 1997.
- Continue, in FY 2000, to assist all participating States in eliminating acceptance barriers to deployment through common protocols, training, improved state practices, and deployment workshops. Through FY 1999, this activity has been assumed under the sponsorship of the Environmental Commissioners of the States. Over 20 protocols and technology guidance documents have been issued.
- Continue, in FY 2000, update of site science and technology needs and responsive Focus Areas activities and technologies. Over 600 Science and Technology needs were identified for Focus Area response in FY 1999.
- Continue, in FY 2000, to provide recommendations for enhancing safety, reducing fatigue and stress, greater user acceptance, efficiency, and productivity for Office of Science Technology technologies.
- Reduce, in FY 2000, DOE funding requirements for Interstate Technology and Regulatory Cooperation workgroup by encouraging increased state, other Federal, private sector, and other funding participation.
- Continue, in FY 2000, to facilitate access to international expertise. In FY 1998 and FY 1999, approximately 25 international scientific and technical tasks will have been identified.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Program Information, Review and Analysis	4,379	6,451	6,050	-401	-6.2%
Regulatory and Site Acceptance	6,945	8,471	6,550	-1,921	-22.7%
International Technology Coordination	1,498	600	600	0	>999.9%
Safety Testing	0	2,000	1,700	-300	-15.0%
Total, Technology Acceptance and Support	12,822	17,522	14,900	-2,622	-15.0%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Program Information, Review, and Analysis

Activities will focus on sound business practices, program and peer reviews, and the Office of Science and Technology program data collection, analysis and dissemination. The Center for Acquisition and Business Excellence at the Federal Energy Technology Center assists the Office of Science and Technology with the implementation of its business management and control processes. Independent external peer and programmatic reviews will continue to enhance quality and acceptability of key Focus Area decisions and data. Program information and communications provides the Office of Science and Technology with the ability to collect, maintain, analyze, and disseminate key information to assist developers, site users, regulators, investors, and other stakeholders in key decisions. Credible estimates of cost savings and other innovative technology benefits promote increased acceptance of technologies by sites. In cooperation with other EM organizations, Technology Acceptance and Support develops methodologies for calculating life-cycle cost savings of new technologies. Total program impact on cleanup mortgage reduction projections are developed based on the EM strategy. Without these various programs and activities, EM decision makers would not have the information needed to support technology support or deployment decisions or to report impacts of deployments.

- Continue providing all key Office of Science and Technology information through the Technology Management System and other communication tools to aid in overall Office of Science and Technology business and program management. Identify and meet the dynamic communication needs of existing and additional audiences as technology solutions mature. Institute improved management processes.
- Update and continue life-cycle impact estimates for innovative technologies, with emphasis on potential cost savings, using the EM standardized methodology.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue conducting independent review of Office of Science and Technology programs and significant processes, and provide peer reviews of Office of Science and Technology technologies.			
Program Information, Review, and Analysis	4,379	6,451	6,050

Regulatory and Site Acceptance

Regulatory and site acceptance are prerequisites to innovative technology deployment in support of the EM goal of accelerating cleanup. In the past, states have worked separately and have required duplicative demonstrations and inconsistent protocols to achieve permitting for local use, greatly slowing down multi-site deployments. Office of Science and Technology assists states through their Interstate Technology and Regulatory Cooperation work group in establishing verification protocols, reciprocity guidelines, and training to expedite multi-state permitting and multi-site deployments. Site acceptance of innovative technologies is facilitated by early clarification of site needs, by finding technologies to meet the needs, and by involving end users and stakeholders in the decision processes through such mechanisms as Site Technology Coordination Groups. This activity also provides for field management and reporting of management and operations activities supporting Office of Science and Technology, and assists coordination of planning efforts within the national laboratory community. This program further assists in technology acceptance and deployment at specific DOE cleanup sites as appropriate.

- Continue to assist all participating states in eliminating acceptance barriers to deployment through common protocols, systems and training and deployment workshops. Reduce DOE funding requirements for Interstate Technology and Regulatory Cooperation workgroup by encouraging increased state, other Federal, private sector, and other funding participation. Continue to document use of Interstate Technology and Regulatory Cooperation workgroup publications and technology deployments.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Update site science and technology needs, and continue to support management of site science and technology activities. Facilitate communications among site stakeholders and technology developers in order to catalyze the use of innovative science and technology solutions and pursue other activities to facilitate rapid deployment.			
Regulatory and Site Acceptance	6,945	8,471	6,550

International Technology Coordination

EM needs access to environmental technologies, scientific expertise, technical information, and foreign markets that can further DOE's cleanup mission. Through Memoranda of Cooperation, Office of Science and Technology collaborates with the scientific communities of Russia, Poland, Argentina and the United Kingdom in joint research and development to meet these needs. These efforts ensure continued awareness of opportunities for site users to access relevant foreign environmental technologies, data, and expertise to accelerate cleanup. Through these activities, Office of Science and Technology leverages the relationships established with the international science and technology community over the past 10 years to maintain access to foreign technologies with minimal increase in investment. Without these efforts, EM sites will not effectively receive the benefit of international technologies and expertise.

- Continue ongoing coordination and identification of available opportunities for EM participation with the international science and technology community. Level of effort for this activity will remain constant. Work is conducted with Argentina, Poland, Russia, and the United Kingdom under bilateral agreements.

International Technology Coordination	1,498	600	600

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Safety Testing			
DOE site cleanup work can be performed more responsibly and effectively through technology improvements that increase safety and contribute to user and worker acceptance of those technologies. Technology Acceptance and Support conducts worker safety assessments of high impact environmental technologies to improve technology safety, reduce worker fatigue and stress, increase comfort, and gain increased user and worker acceptance. Without this activity, user and worker acceptance may be reduced, potentially lessening benefits from Office of Science and Technology investments.			
■ Continue to provide recommendations for enhancing safety, reducing fatigue and stress, greater user acceptance, efficiency, and productivity for Office of Science and Technology technologies.			
Safety Testing	0	2,000	1,700
Total, Technology Acceptance and Support	12,822	17,522	14,900

Explanation of Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Program Information, Review, and Analysis	
■ Slight decrease in communication activities	-401
Regulatory and Site Acceptance	
■ Decrease reflects planned reduction, in FY 2000, for the Interstate Technology Regulatory Cooperation workgroup as other funding sources (state, other Federal, private sector, etc.) are developed and a reduction in deployment support	-1,921
International Technology Coordination	
■ No change.	0
Safety Testing	
■ Fewer worker safety assessments of Science and Technology technologies will be conducted	-300
Total Funding Change, Technology Acceptance and Support	-2,622

Small Business Innovative Research Program (Technology Development)

Mission Supporting Goals, and Objectives

Program Mission

Provide funding to the Small Business Innovative Research program for small businesses to participate in research and development activities that benefit the EM program.

Program Goal

The goal of this program is to use technologies developed by the small business community to accelerate and reduce the cost of cleanup at EM sites.

Program Objectives

The objective is to deploy technologies that meet the EM mission as rapidly as possible.

Performance Measures

There are no quantifiable corporate performance measures associated with this program.

Significant Accomplishments and Program Shifts

- Continue to support this program and provide opportunities for the small business community to make contributions to the EM mission.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Small Business Innovative Research Program (Technology Development)	0	2,224	2,000	-224	-10.1%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Small Business Innovative Research Program (Technology Development)			
Funding is requested for the Small Business Innovative Research assessment in accordance with Public Law 102-564, which mandates a percentage of all research and development dollars be set aside for grants to small businesses. Once funding is appropriated, it is transferred to the DOE Office of Science for award and administration of grants to small businesses.			
Small Business Innovative Research Program (Technology Development	0	2,224	2,000
Total, Small Business Innovative Research Program (Technology Development	0	2,224	2,000

Explanation of Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Small Business Innovative Research Program (Technology Development)	
■ Decrease reflects lower assessment due to overall decrease to the Technology Development program research and development dollars from FY 1999 to FY 2000	-224
Total Funding Change, Small Business Innovative Research Program (Technology Development)	-224

Environmental Management Science Program

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Office of Science and Technology's Science Program is to develop and fund a targeted long-term basic research program that will result in transformational or breakthrough approaches for solving the Department's environmental problems. This program is a collaborative effort between the Department's Office of Environmental Management and Office of Science.

Program Goal

The goal of the Office of Science and Technology's Science Program is to continue to solicit and support world class basic research that has the potential to lead to significant, quantum improvements in the understanding of scientific principles and phenomena in areas of interest to the EM mission; to validate existing technical solutions to complex problems; to provide technical solutions where currently there are none; and to lead to future risk reduction and cost and time savings.

Program Objectives

The objectives of the Office of Science and Technology Science program are to widely solicit research needs, and use an open, fair and competitive selection process to distribute research funding. Site-specific research needs have been solicited through a variety of activities including workshops at Richland, Savannah River Site, Oak Ridge, and Idaho National Engineering and Environmental Laboratory; a complex-wide needs survey; solicitation or science research needs in support of the *Accelerating Cleanup: Paths to Closure* plan from the Site Technology Coordinating Groups; and through systems engineering analysis performed by the Idaho National Engineering and Environmental Laboratory. The importance of basic scientific research to the EM cleanup mission has been established in several reports, specifically the Galvin Commission report (1995) entitled *Alternative Futures for the Department of Energy National Laboratories* and the National Research Council report (1996) entitled *Improving the Environment: An Evaluation of Doe's Environmental Management Program.* The Environmental Management Advisory Board Science Committee is supportive of the EM Science Program and its accomplishments in what has been a relatively short time of existence (i.e., the Environmental Management Science Program is up and running, employs a competitive and fair selection process, has distributed research funding, has research underway, and research to date looks favorable).

Performance Measures

No quantifiable corporate performance measures are associated with the program.

Significant Accomplishments and Program Shifts

- In May 1998, the Science Program received a "HAMMER" award from the Vice President's National Performance Review Team.

In addition, major areas of scientific research needs addressed by the EM Science Program awards include:

- Advanced methods to characterize, remove, and treat high-level wastes in tanks.
- New approaches and methods for the decontamination and decommissioning of contaminated facilities and equipment.
- Identification of ways to reduce uncertainty in the long-term containment performance of spent nuclear fuel in storage and disposal.
- Advanced methods for conversion of fissile materials to more stable forms.
- Improved scientific information for the characterization, treatment, and monitoring of mixed radioactive and hazardous materials.
- New concepts for developing suitable storage forms for each type of waste that needs to be stored.
- Reduced scientific uncertainty in the levels of risk to human health at the end stages of cleanup efforts.
- New approaches and methods to address problems in subsurface contamination and transport processes in the vadose zone.
- Approaches to develop a better scientific basis for understanding exposures and risks to humans from low dose radiation that can be used to achieve acceptable levels of human health protection at the lowest possible cost.

As the EM Science Program matures it will continue to fund basic research and development to address the evolving science needs of EM sites. The program intends to ensure that it is addressing the right research questions, disseminating research results, and getting the "best science" by:

- Evaluating ongoing research.
- Communicating the nature of the program, and its research results, to as wide an audience as possible.
- Holding site-specific, and complex-wide workshops to link basic research developed within and outside the Department, with technology users, both within, and outside the Department. The first complex-wide workshop was held in July 1998 and the American Chemical Society will host a session on the Environmental Management Science Program research at their national symposium in Summer 1999. A second complex-wide workshop is being planned Spring 2000.

- Developing a national science research plan based on needs identified by sites through the project baseline summaries. National Academy of Sciences/National Research Council will complete a plan for subsurface contamination in Fall of 1999.
- Coordinating and leveraging research efforts and capabilities with other DOE programs, other federal agencies, academia, and the private sector.

The EM Science program supports DOE's strategic goal to deliver the scientific understanding and technological innovations that are critical to the success of DOE's mission and the Nation's science base. The program directly supports the objective to develop the science that underlies DOE's long-term mission.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
FY1996 Awards	23,139	20,512	0	-20,512	-100.0%
FY 1997 Awards	9,655	8,035	7,924	-111	-1.4%
Integration of Research Results into the Program	1,316	1,880	1,500	-380	-20.2%
FY 1998 Awards	12,000	3,379	10,400	7,021	207.8%
FY 1999 Awards	0	12,032	11,411	-621	-5.2%
Small Business Innovative Research Program	0	1,162	765	-397	-34.2%
Total, Environmental Management Science Program	46,110	47,000	32,000	-15,000	-31.9%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
FY 1996 Awards			
In FY 1996, 136 three-year research projects at 52 universities, 11 Department of Energy National Laboratories and other private and public technology developers and researchers were initiated. Seventy-one of the projects focused on science needed to improve remedial action processes; 26 focus on finding better ways to treat and destroy high level radioactive waste, 23 focus on waste containing a mixture of radioactive and other hazardous materials (mixed waste); 10 focus on better understanding the health and ecological risks associated with environmental cleanup options; and the remaining 6 focus on technical problems with facility deactivation and decommissioning and spent nuclear fuel stabilization and disposal. The national laboratory research project funding is focused on problems in the areas of: subsurface contaminants (48%); radioactive tank waste (24%), mixed waste characterization, treatment, and disposal (15%), decontamination and decommissioning (4%), nuclear materials (2%), and health/ecology/risk (7%).			
■ Complete, in FY 1999, grants initiated in FY 1996.			
FY 1996 Awards	23,139	20,512	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

FY 1997 Awards

In FY 1997, 66 additional three-year research projects were initiated. Over half of the 66 award recipients are collaborative efforts among universities, laboratories and private industry. Of these projects, 28 will be led by universities; 31 by DOE National Laboratories; and 7 by private industry, nonprofit research centers, and other federal laboratories. Twenty-two of the projects focus on finding better ways to treat and destroy high level radioactive waste; nine focus on waste containing a mixture of radioactive and other hazardous materials; five focus on spent nuclear fuel treatment and destruction; and six address the materials used in weapons production (nuclear materials). The remaining 24 projects deal with the science needed to improve remedial action processes, to safely carry out deactivation and decommissioning of DOE sites, and to better understand the health and ecological risks associated with environmental cleanup options. The research funded at the national laboratories is focused on problems in the areas of: radioactive tank waste (43%), nuclear materials (18%), subsurface contaminants (14%), decontamination and decommissioning (8%), mixed waste characterization, treatment, and disposal (4%), spent nuclear fuel (4%), and research projects supporting multiple categories (9%).

- Complete, in FY 2000, grants initiated in FY 1997.

FY 1997 Awards	9,655	8,035	7,924

Integration of Research Results into the Program

Management, analysis, and integration. Success of the EM Science Program is dependent on the application of scientific results in EM Focus areas and directly in field activities, enhancing EM's ability to meet compliance requirements.

- Disseminate FY 1996, FY 1997, and FY 1998 research results to EM project managers based on science needs and problem areas and to potential technology developers. Provide links with DOE project managers, research community, and potential technology users.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Conduct topical workshops and seminars on specific science topics and/or site specific topics to disseminate results in a timely manner. Conduce a second complex-wide workshop to link basic research developed in the program with technology developers.			
■ Implement process to review the results of research awards from FY 1996 and FY 1997 to determine if the next step is additional follow-on basic research, applied research, incorporation of results directly into technology development, or direct application of results to an EM problem area.			
■ Refine and improve long term site specific and national science research agenda on needs identified in EM's cleanup strategy and through EM's roadmapping effort.			
Integration of Research Results Into the Program	1,316	1,880	1,500
FY 1998 Awards			
In FY 1998, 33 additional three-year research projects were initiated involving 23 universities, 6 DOE National Laboratories and 7 private industry or other federal laboratories, in 20 states. A total of two-thirds of the 33 award recipients are collaborative efforts among universities, laboratories and private industry. Of these projects, 9 will be led by universities; 22 by DOE National Laboratories; and 2 by private and other federal laboratories. Twenty of the projects focus on finding better ways to treat and destroy high level radioactive waste and 13 deal with the science needed to improve and safely carry out the deactivation and decommissioning of DOE sites. The research funded at the national laboratories is focused on problems in the area of radioactive tank waste (64%) and decontamination and decommissioning (36%).			
■ Continue to support grants in the areas of high level waste and decontamination and decommissioning.			
FY 1998 Awards	12,000	3,379	10,400

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
FY 1999 Awards			
FY 1999 awards will be made by September 1999 to address scientific problems associated with vadose zone, subsurface contamination, and groundwater issues to support initiatives at sites such as Hanford and to develop a better scientific basis for understanding exposures and risks to humans from low dose radiation. Research will be selected based on its scientific merits and its relevance to the EM mission.			
■ Continue to support research awards in the area of vadose zone, subsurface contamination and groundwater and in the area of exposures and risks from low dose radiation.			
FY 1999 Awards	0	12,032	11,411
Small Business Innovative Research Program			
■ Assessment on research funds in accordance with Public Law 102-564.			
Small Business Innovative Research Program	0	1,162	765
Total, Environmental Management Science Program	46,110	47,000	32,000

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
FY 1996 Awards	
■ Decrease reflects completion, in FY 1999, of research grants initiated in FY 1996	-20,512
FY 1997 Awards	
■ Decrease reflects completion, in FY 2000, of research grants initiated in FY 1997	-111
Integration of Research Results into the Program	
■ Slight decrease in management, analysis and integration of research result activities	-380
FY 1998 Awards	
■ Significant increase supports mortgages related to research grants awarded in FY 1998	7,021
FY 1999 Awards	
■ Slight decrease supports mortgages related to research grants awarded in FY 1999	-621

	FY 2000 vs FY 1999 ($000)
Small Business Innovative Research Program	
■ Decrease reflects reduced assessment due to the overall reduction of EM Science Program research and development funding from FY 1999 to FY 2000	-397
Total Funding Change, Environmental Management Science Program	-15,000

Environmental Management Risk Policy Program

Mission Supporting Goals, and Objectives

Program Mission

The mission of the Environmental Management National Risk Policy Program, through a partnership between the Center for Risk Excellence, located in Chicago, and the Headquarters Risk Policy Program is to develop policies and strategies to manage and reduce risks at the sites and to communicate risk information to stakeholders.

Program Goal

The overall goal of the Environmental Management National Risk Policy Program is to provide guidance, tools, technical support and training that result in credible risk-based environmental decisions which protect human health and the environment and involve meaningful stakeholder participation.

Program Objectives

The Environmental Management National Risk Policy Program will implement its goal by developing policy, assisting the field, interacting with stakeholders, and responding to internal and external information requests.

Performance Measures

No quantifiable corporate performance measures are associated with this program.

Significant Accomplishments and Program Shifts

- Creating tools and training for Project Managers to ensure that they can adequately convey risk management tradeoffs to stakeholders, and reach consensus-based decisions.
- Leveraging and coordinating risk research with research supported by other organizations inside and outside the Department of Energy (National Laboratories, Environmental Protection Agency, National Institute of Occupational Safety and Health, etc.)
- Providing technical support to EM's Field elements to implement a credible site-specific process for risk analysis, risk management, risk communication, and priority setting initiatives.

- Providing technical peer review and comments on scientific and technical risk materials, both internally and externally, through nationally recognized scientific and technical organizations.
- Integrating risk information into the planning process for establishing priorities among competing EM requirements, simplifying the use of risk in the budget priorities, and in facilitating the use of risk in measuring performance.
- Developing Site Hazard and Risk Profiles to identify human health, worker, ecological, and transportation risks and to delineate programmatic risks.
- Support research through a Cooperative Agreement with the Consortium for Risk Evaluation and Stakeholder Participation (CRESP, which is a partnership between the University of Medicine and Dentistry of New Jersey and the University of Washington). These independent institutions conduct research which is focused on national issues concerned with identifying and characterizing risks to human health and well-being; characterizing target ecosystems; linking the presence of contaminants with the endpoint; developing innovative approaches to the evaluation and protection of hazardous waste workers; and incorporating social cultural and economic impacts into the risk paradigm.
- In FY 1999, supporting research through an award with the Consortium for Environmental Risk Evaluation (CERE, which is a partnership between Tulane University and Xavier University). The research is focused on health and ecological risk analysis, risk assessment, risk communication, and risk management issues, including evaluation of stakeholder issues, design and evaluation methods for evaluating innovative technologies, and assessing risk associated with cleanup and long-term stewardship.

The program will integrate baseline risk information within a number of key topical risk areas and develop rosters of expertise, related materials, and action plans (with follow-ups), e.g., for facilitated enhancement of existing decision processes and information exchange with regard to critical lessons learned. This will involve coordinating experts from across the complex to develop solutions for specific risk issues, pursuant to a tiered response system that considers requests for assistance based on the urgency of the request and nature/extent of resources required. The program will support and promote the development and implementation of emerging technologies and cost-efficient, protective measures for reducing risk and mortgage costs.

This program supports DOE's strategic goal to aggressively clean up the environmental legacy associated with nuclear weapons production and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the nation's radioactive wastes. The program provides guidance and tools to assist the project managers in collection of the information that will ensure that high risk projects are prioritized and funded and that risk to workers, the public, and the environment continue to decrease over time.

It also supports DOE's commitment to ensuring the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.

Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
National Risk Policy Program	3,000	3,000	2,000	-1,000	-33.3%
University of Medicine and Dentistry of New Jersey and University of Washington (CRESP) Grant	4,000	4,000	3,000	-1,000	-25.0%
Center for Environmental Risk Evaluation (CERE) Grant at Tulane and Xavier Universities	0	2,000	0	-2,000	-100.0%
Total, Environmental Management Risk Policy Program	7,000	9,000	5,000	-4,000	-44.4%

Detailed Program Justification

(dollars in thousands)		
FY 1998	FY 1999	FY 2000

National Risk Policy Program

The National Risk Policy Program, in partnership with the Chicago Center for Risk Excellence, develops risk-based decision making approaches, including guidance documents and metrics to measure risk reduction to meet goals established for EM under the Government Performance and Results Act and DOE strategic plan.

- Continue activities to refine and implement policies and strategies to protect human health and the environment, and continue to involve stakeholders in the risk-based decision-making process. For example, develop new tools for decisions in decontamination and decommissioning activities and recycling of waste material, and facility re-use.
- Implement a process to evaluate risks and hazards associated with the long term stewardship issues to protect the public and the environment, with issues related to worker safety, and with ecological risk.
- Implement a process to assist the DOE field sites to measure progress toward risk reduction.
- Work with sites to peer review risk related evaluations and assessments.
- Develop a web-based system to provide service-oriented environmental risk assessment expertise using a diverse set of risk tools.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Create a National Referral System listing academic, industrial, government, and national laboratory experts in all areas of risk.			
National Risk Policy Program	3,000	3,000	2,000

University of Medicine and Dentistry of New Jersey and University of Washington (CRESP) Grant

Support a cooperative agreement with the Consortium for Risk Evaluation and Stakeholder Participation (University of Medicine and Dentistry of New Jersey and University of Washington) to perform risk research and develop risk analysis tools to better understand the diverse cleanup risks found at major DOE sites such as Savannah River and Hanford.

- Consortium for Risk Evaluation and Stakeholder Participation will complete research that addresses issues or problems in the following areas:
  - Characterization of risks to human health
  - Development of innovative approaches for the evaluation of risks associated with the protection of hazardous waste work;
  - Development of techniques and approaches to assess the risk and effectiveness of environmental restoration and waste management alternatives;
  - Improvement of methods and databases for linking the presence of contaminants with receptor endpoints;
  - Integration of ecological risk methods into hazard identification;
  - Development of criteria for preservation or restoration of ecological systems in relation to remediation alternatives.

University of Medicine and Dentistry of New Jersey and University of Washington (CRESP) Grant	4,000	4,000	3,000

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Center for Environmental Risk Evaluation (CERE) Grant at Tulane and Xavier Universities			
Support an award with the Center for Environmental Risk Evaluation (Tulane University and Xavier University) to perform research in risk assessment, risk management, and risk communication. Research to focus on evaluation of risks associated with stakeholder issues, long-term stewardship, and innovative environmental technologies.			
■ Activity will not be funded in FY 2000.			
Center for Environmental Risk Evaluation (CERE) Grant at Tulane and Xavier Universities	0	2,000	0
Total, Environmental Management Risk Policy Program	7,000	9,000	5,000

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
National Risk Policy Program	
■ Decrease reflects reduced activity in the areas of: 1) development of new risk tools and training; 2) technical support to EM Field elements for site-specific processes for risk analysis, risk management, risk communication and priority setting initiatives; 3) technical peer review and comments on scientific and technical risk materials; and 4) integration of risk information into the planning process	-1,000
University of Medicine and Dentistry of New Jersey and University of Washington (CRESP) Grant	
■ Decrease reflects reduced support for the Consortium for Risk Evaluation and Stakeholder Participation (CRESP) cooperative agreement	-1,000
Center for Environmental Risk Evaluation (CERE) Grant at Tulane and Xavier Universities	
■ Grant will not be funded in FY 2000	-2,000
Total Funding Change, Environmental Management Risk Policy Program	-4,000

Environmental Management Program Direction

Mission Supporting Goals and Objectives

Program Direction provides support to the Federal work force responsible for the overall direction and administrative support of the Environmental Management (EM) program, including both Headquarters and field personnel. The EM mission of protecting human health and the environment is carried out by a work force composed largely of contractors, although there are a variety of functions that are inherently governmental (e.g., program management, contract administration, and interagency and international coordination) that require a dedicated Federal work force.

The role of the Headquarters Federal work force is to provide leadership, establish and implement national policy, conduct analyses and integrate activities across sites. Increasing standards of accountability for program performance and spending require Headquarters staff to analyze budget requests, track expenditures and monitor uncosted balances, assess cumulative impacts of compliance agreements signed by field offices, and compile Congressionally mandated and other program plans (e.g., life cycle baselines, five-year plans, and future land use and long-term stewardship plans). Also, interactions with non-DOE government employees (e.g., United States Interagency Workgroups on Superfund Reform, participation in International Atomic Energy Agency activities, and negotiations with foreign embassies and reactor operators) are most appropriately performed by Federal employees rather than contractors. Finally, Headquarters personnel assess the progress of planned program activities in order to report to Congress, Federal, State and local governments, Indian Tribes, citizen groups and the public on the status of EM programs.

Field personnel are responsible and directly accountable for implementing the EM program within the framework established by Headquarters policy and guidance. In addition, the field is responsible for the day-to-day oversight of the Department's facilities, the facility contractor and other support contractors, as well as construction and test activities that support EM activities for the Department of Energy. The field office personnel are responsible for planning and implementing performance improvement programs and the technical programs needed to comply with standards and regulations. The field is also responsible for the preparation of regulatory documents and interaction with the regulators who have oversight of facility operations. The field staffing level include personnel supporting the analytical laboratories.

Program Direction has been grouped into four categories:

- Salaries and Benefits for FY 2000 provide for 425 Federal full-time equivalents based on Department Strategic Alignment Initiative end of year targets at Headquarters (employees based in Germantown, Maryland and Washington, DC), and 2,299 Federal full-time equivalents at the ten major Operations/Field Offices located throughout the United States, the Carlsbad Area Office located in New Mexico, and the Federal Energy Technology Center with facilities located in Morgantown, West Virginia and Pittsburgh, Pennsylvania. In addition, funding is provided for worker's compensation payment to the Department of Labor, benefits associated with permanent change of station, transit subsidies and incentive awards.

- Travel includes all costs of transportation, subsistence, and incidental travel expenses of EM's Federal employees in accordance with Federal Travel Regulations. This also includes travel costs associated with permanent change of duty station.
- Support Services includes technical and administrative support, program management and integration, management information and support systems, performance systems, and cost/schedule studies. Program management includes support for organizational and strategic planning, coordination and interaction with other Federal, State and local government agencies and private industrial concerns, performance measurement and cost assessment. Administration support includes funding for personnel development, training, travel, and logistics support.

  Technical support services includes funding for services which include, but are not limited to, determining feasibility of design considerations; development of specifications, system definition, system review and reliability analyses; trade-off analyses; economic and environmental analyses which may be used in the Department of Energy's preparation of environmental impact statements; and test and evaluation, surveys or reviews to improve the effectiveness, efficiency and economy of technical operations.

  Management support services includes funding for services which include, but are not limited to, analyses of workload and work flow; directives management studies; automated data processing; manpower systems analyses; assistance in the preparation of program plans; training, and education; analyses of Departmental management processes; and any other reports or analyses directed toward improving the effectiveness, efficiency and economy of management and general administrative services.
- Other related expenses includes funding for training the Federal work force, rental of office space, building maintenance, telephone and network communication costs, utilities, computer/video support, printing and graphics, photocopying, postage, and office supplies and equipment at Headquarters and the Operation/Field Offices. A Working Capital Fund was established at Headquarters in FY 1997 by the Office of Human Resources to allocate the cost of common administrative services to the recipient Headquarters organizations. Activities supported by the Working Capital Fund include automated office support, telephone services, postage, printing and graphics, supplies, photocopying, building occupancy, electronic services, payroll processing, contract closeouts and the Corporate Executive Information System.

Performance Measures

Work Force Management Efforts

EM continues to move forward with downsizing efforts to achieve an appropriate Headquarters/field balance of Federal resources to efficiently carry out the EM mission. The EM program has made significant decreases in the size of the Headquarters Federal work force. Staffing levels have been reduced by more than 260 employees (a 37% reduction) since May 1996 and more than 340 (a 44% reduction) from its highest employment level of 772 in July 1995.

EM will continue to place a high priority on work force management in the future to constantly evaluate and adjust, as necessary, the organizational structure, roles and responsibilities, skills mix, performance measurement, and systems of shared values and incentives. With the successful completion of the Strategic Alignment Initiative, the Department is currently implementing the next phase in work force management, *Workforce for the 21st Century Initiative*, commonly known as *Workforce 21*. The focus of *Workforce 21* is to strengthen the Department's technical and management capabilities to fulfill the critical missions for the Nation. This initiative provides EM with a process to identify, hire and train personnel in key areas with skills and technical expertise that are critical to the success of the EM program.

Although these changes have been difficult, EM believes that it now has an appropriate level of staffing, consistent with *Workforce 21,* to address the challenges that lie ahead. The FY 2000 level of funding is necessary to stabilize both the Headquarters and field work force, allowing EM to meet its current and future environmental, financial, managerial, and technical needs. Funding below the FY 2000 request for the Program Direction account would hinder overall performance by further eroding the capability for contractor oversight, management of programs, and maintaining the necessary technical expertise.

Support Services Reductions

Support services are a cost-effective method to obtain short-term, specialized technical or administrative expertise needed to solve unique problems that are beyond the capability or availability of the Federal work force. Often, specific skills are not required on a full-time basis, and it would not be prudent management to hire Federal staff with such specific skills. These services vary in nature to cover a variety of areas such as: nuclear criticality; nuclear construction; safety and health services; technical training development; security services; printing and reproduction services; office automation/local area network support; and correspondence control/records management services. In the last three years, significant reductions in support services have been realized, particularly at Headquarters. The majority of support services are technical in nature with discrete, well-defined tasks. Non-technical support provides management support for bench marking, metrics management and activities aimed at increasing quality and cost effectiveness in the oversight of the EM program. A small portion of the non-technical support provides for administrative activities such as mail room operations where it has been determined to be more cost effective to contract out these activities in lieu of hiring additional federal staff.

Analytical Laboratories

Environmental Measures Laboratory

In FY 1998, EM assumed full responsibility for the Environmental Measurements Laboratory from the Office of Energy Research in accordance with the terms specified in a Memorandum of Agreement. The Environmental Measurements Laboratory is located in New York, New York, and falls under the auspices of the Chicago Operations Office. The Environmental Measurements Laboratory is a government-owned, government-operated environmental research laboratory with history dating back to the Manhattan Project. Its current mission is to respond to the Department of Energy and other Federal and international agencies regarding quality assurance, environmental and national security issues, and

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to conduct research on radioactive and other energy-related pollutants that impact on human health and the environment.

EM's contribution to the Environmental Measurements Laboratory in FY 2000 will be $5,250,000. This level of funding will support the Federal work force of approximately 60 employees. However, the funding is not sufficient to support all of the administrative costs associated with the Laboratory. Work for others, such as the Office of Nonproliferation and National Security, the Office of Science, the United States Air Force, the United States Nuclear Regulatory Commission and other federal agencies will generate additional funding to be used for programmatic and administrative expenses incurred by this laboratory.

Radiological and Environmental Sciences Laboratory

EM Program Direction supports the Radiological and Environmental Sciences Laboratory, also a government-owned, government-operated laboratory located in Idaho Falls, Idaho, and reporting to the Idaho Operations Office. EM provides approximately $2,700,000 annually to support 25 Federal full-time equivalents and associated laboratory expenses. The Radiological and Environmental Sciences Laboratory provides an independent resource free from conflict-of-interest in the area of analytical metrology (metrics) and measurement quality assurance. This facility is a federal technical resource and reference laboratory for the National Analytical Management Program. The major activities include the Mixed-Analyte Performance Evaluation Program, the DOE Methods Compendium, participation on the National Radiological Management Program Steering Committee and assistance with technical issues. These programs require and support traceability in analytical measurements to the National Institute of Standards and Technology. The expertise at the Radiological and Environmental Sciences Laboratory provides a federal technical resource for special analytical projects.

Organizational Changes

Creation of the Office of River Protection

The Office of River Protection was created at the Hanford Reservation, Richland, Washington, in accordance with Section 3139 of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (Public Law 105-261). This Office is responsible for managing all aspects of the Tank Waste Remediation System, also known as the Hanford Tank Farm operations with the critical mission to immobilize Hanford's high-level tank waste and protect the Columbia River. This budget requests an additional 27 full-time equivalents to support this office, in addition to 76 full-time equivalents that have been reassigned from within the Richland Operations Office. These positions will provide management and supervision, senior technical and financial expertise, engineering and scientific oversight, quality assurance, legal, contract finance and administration, and financial market and private capital project financing necessary to fully integrate tank farm operations and the privatization activities which are performed by two separate contracts. It is critical that this oversight/integration is performed by Federal employees to avoid any conflict of interest issues, or negative impacts.

Use of Prior-Year Balances

The FY 1998 Energy and Water Development Appropriations Conference report [report 105-271] included language which stated that "The Department will carry unobligated balances into fiscal year 1998 which will increase the funding available in this account." With this in mind, the FY 1998 Appropriation of $345,000,000 was augmented with $28,192,000 of FY 1997 unobligated balances. The majority of the unobligated balances were used to fully fund the authorized work force within the staffing guidelines dictated by the Strategic Alignment Initiative, thus avoiding a budget-driven reduction-in-force.

In FY 1999, an additional $9,126,000 of unobligated balances were used to offset the reduction in the FY 1999 Energy and Water Appropriation. The use of unobligated balances restored funding to the FY 1999 request level, thereby avoiding significant impacts in this account.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque					
Salaries and Benefits	13,795	10,879	10,903	24	0.2%
Travel	2,256	878	847	-31	-3.5%
Support Services	2,320	2,268	1,805	-463	-20.4%
Other Related Expenses	1,444	825	796	-29	-3.5%
Total, Albuquerque	19,815	14,850	14,351	-499	-3.4%
Full-Time Equivalents	145	134	129	-5	-3.7%
Carlsbad Area Office					
Salaries and Benefits	4,507	4,939	4,942	3	0.1%
Travel	402	350	338	-12	-3.4%
Support Services	0	0	0	0	>999%
Other Related Expenses	1,739	1,895	1,828	-67	-3.5%
Total, Carlsbad Area Office	6,648	7,184	7,108	-76	-1.1%
Full-Time Equivalents	56	61	61	0	0.0%
Chicago					
Salaries and Benefits	8,933	9,476	9,470	-6	-0.1%
Travel	480	450	434	-16	-3.6%
Support Services	857	214	211	-3	-1.4%
Other Related Expenses	518	500	482	-18	-3.6%
Total, Chicago	10,788	10,640	10,597	-43	-0.4%
Full-Time Equivalents	107	110	106	-4	-3.6%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Federal Energy Technology Center					
Salaries and Benefits	5,302	5,397	4,528	-869	-16.1%
Travel	329	325	314	-11	-3.4%
Support Services	903	850	820	-30	-3.5%
Other Related Expenses	475	68	66	-2	-2.9%
Total, Federal Energy Technology Center	7,009	6,640	5,728	-912	-13.7%
Full-Time Equivalents	66	65	51	-14	-21.5%
Idaho					
Salaries and Benefits	21,550	20,619	21,287	668	3.2%
Travel	875	960	926	-34	-3.5%
Support Services	1,750	2,000	1,929	-71	-3.6%
Other Related Expenses	1,230	1,183	1,395	212	17.9%
Total, Idaho	25,405	24,762	25,537	775	3.1%
Full-Time Equivalents	240	239	236	-3	-1.3%
Nevada					
Salaries and Benefits	3,934	4,110	4,123	13	0.3%
Travel	210	203	193	-10	-4.9%
Support Services	2,192	1,648	1,574	-74	-4.5%
Other Related Expenses	274	95	92	-3	-3.2%
Total, Nevada	6,610	6,056	5,982	-74	-1.2%
Full-Time Equivalents	56	55	53	-2	-3.6%
Oakland					
Salaries and Benefits	5,978	6,034	6,105	71	1.2%
Travel	416	350	338	-12	-3.4%
Support Services	1,038	1,200	1,158	-42	-3.5%
Other Related Expenses	898	1,500	1,447	-53	-3.5%
Total, Oakland	8,330	9,084	9,048	-36	-0.4%
Full-Time Equivalents	70	72	69	-3	-4.2%
Oak Ridge					
Salaries and Benefits	12,205	11,632	11,535	-97	-0.8%
Travel	638	635	613	-22	-3.5%
Support Services	2,342	1,800	1,737	-63	-3.5%
Other Related Expenses	2,264	2,809	2,682	-127	-4.5%
Total, Oak Ridge	17,449	16,876	16,567	-309	-1.8%
Full-Time Equivalents	140	139	133	-6	-4.3%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Ohio					
Salaries and Benefits	18,300	17,386	18,803	1,417	8.2%
Travel	615	610	588	-22	-3.6%
Support Services	2,681	3,303	3,187	-116	-3.5%
Other Related Expenses	2,861	1,833	2,067	234	12.8%
Total, Ohio	24,457	23,132	24,645	1,513	6.5%
Full-Time Equivalents	223	223	224	1	0.4%
Richland					
Salaries and Benefits	41,368	43,363	47,660	4,297	9.9%
Travel	1,626	1,440	1,366	-74	-5.1%
Support Services	10,482	8,589	7,274	-1,315	-15.3%
Other Related Expenses	13,236	11,660	13,071	1,411	12.1%
Total, Richland	66,712	65,052	69,371	4,319	6.6%
Full-Time Equivalents	494	508	535	27	5.3%
Rocky Flats					
Salaries and Benefits	24,437	22,027	22,557	530	2.4%
Travel	817	765	710	-55	-7.2%
Support Services	4,300	4,500	4,341	-159	-3.5%
Other Related Expenses	5,610	2,637	2,450	-187	-7.1%
Total, Rocky Flats	35,164	29,929	30,058	129	0.4%
Full-Time Equivalents	257	247	242	-5	-2.0%
Savannah River					
Salaries and Benefits	39,876	38,453	38,847	394	1.0%
Travel	1,238	1,000	965	-35	-3.5%
Support Services	6,609	6,000	5,788	-212	-3.5%
Other	4,643	5,734	5,761	27	0.5%
Total, Savannah River	52,366	51,187	51,361	174	0.3%
Full-Time Equivalents	490	476	460	-16	-3.4%
Subtotal, Field Offices					
Salaries and Benefits	200,185	194,315	200,760	6,445	3.3%
Travel	9,902	7,966	7,632	-334	-4.2%
Support Services	35,474	32,372	29,824	-2,548	-7.9%
Other Related Expenses	35,192	30,739	32,137	1,398	4.5%
Total, Field Offices	280,753	265,392	270,353	4,961	1.9%
Full-Time Equivalents	2,344	2,329	2,299	-30	-1.3%

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Headquarters					
Salaries and Benefits	49,197	42,053	42,270	217	0.5%
Travel	2,468	2,283	2,132	-151	-6.6%
Support Services	27,601	27,008	26,017	-991	-3.7%
Other Related Expenses	13,173	9,463	8,637	-826	-8.7%
Total, Headquarters	92,439	80,807	79,056	-1,751	-2.2%
Full-Time Equivalents	438	435	425	-10	-2.3%
Total Environmental Management					
Salaries and Benefits	249,382	236,368	243,030	6,662	2.8%
Travel	12,370	10,249	9,764	-485	-4.7%
Support Services	63,075	59,380	55,841	-3,539	-6.0%
Other Related Expenses	48,365	40,202	40,774	572	1.4%
Subtotal, Program Direction	373,192	346,199	349,409	3,210	0.9%
Full-Time Equivalents	2,782	2,764	2,724	-40	-1.4%
Use of Prior-Year Balances					
Salaries and Benefits	-24,974	0	0	0	>999%
Travel	-100	-852	0	852	-100.0%
Support Services	-242	-4,934	0	4,934	-100.0%
Other Related Expenses	-2,876	-3,340	0	3,340	-100.0%
Subtotal, Use of Prior-Year Balances	-28,192	-9,126	0	9,126	-100.0%
Full-Time Equivalents	0	0	0	0	>999%
Total Program Direction					
Salaries and Benefits	224,408 [a]	236,368 [a]	243,030 [b]	6,662	2.8%
Travel	12,270	9,397	9,764	367	3.9%
Support Services	62,833	54,446	55,841	1,395	2.6%
Other Related Expenses	45,489	36,862	40,774	3,912	10.6%
Total, Program Direction	345,000	337,073	349,409	12,336	3.7%
Full-Time Equivalents	2,782 [a]	2,764 [a]	2,724 [a,b]	-40	-1.4%

[a] Includes 29 full-time equivalents in both FY 1998 and FY 999, and 15 full-time equivalents in FY 2000 associated with the former United States Bureau of Mines, which were not included in the President's Budget.

[b] Includes 27 full-time equivalents in FY 2000 in support of the newly created Office of River Protection. These full-time equivalents are fully funded in FY 2000 but were not included in the President's Budget.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Provides funding for 2,724 full-time equivalents in FY 2000 with the responsibility for the overall direction and administrative support of the EM program, including both Headquarters and field personnel. The federal work force performs a variety of functions that are inherently governmental such as program management, contract administration, and interagency and international coordination. An additional 27 full-time equivalents are being requested in FY 2000 to support The Office of River Protection located in Hanford, Washington, while EM's overall full-time equivalents will be reduced by 40 between FY 1999 and FY 2000.	249,382	236,368	243,030
Travel			
Includes all costs of transportation of persons, subsistence of travelers, and incidental travel expenses in accordance with Federal travel regulations which are directly chargeable to EM. EM has decreased travel by $2,606,000 (21 percent) since FY 1998 in response to Congressional and Departmental direction to reduce travel costs.	12,370	10,249	9,764
Support Services			
Provides for technical and administrative support for cost effective short-term/intermittent requirements not available from within the Federal work force. The FY 2000 request reflects a $7,234,000 (11 percent) reduction in the use of support service contractors since FY 1998.	63,075	59,380	55,841

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Provides for administrative support to the Federal work force at both Headquarters and the field. The level of support provided by EM varies at each site depending on EM's role in relation to other Departmental programs. Examples of the type of support that may be provided include rents and utilities, supplies, printing, maintenance and repair of government vehicles and equipment; maintenance and renovations of buildings; janitorial and custodial services; stenographic reporting and typing; recruitments and advertisements; transit operations (shuttle bus); ADP infrastructure maintenance and upgrades, computer support hotline; Internet Services; alarm protection systems; employee health services; and other vendor services. At Headquarters, administrative costs are included in the Working Capital Fund. This category also includes the cost of training the Federal work force. A portion of these types of costs are being reduced commensurately as the number of employees decrease. However, a significant portion of these expenditures are relatively fixed in nature and do not change in relation to the work force. An example would be the cost of leased building space and computer network infrastructure costs.	48,365	40,202	40,774
Total Program Direction	373,192	346,199	349,409

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Salaries and Benefits	
■ An overall increase of $6,662,000 for salaries and benefits is the result of a decrease of 40 full-time equivalents resulting in a savings of $3,429,000 across the Environmental Management complex, offset by an increase of $10,091,000 to cover a 4.1 percent escalation factor for personnel related expenses for 2,724 Full-time equivalents in accordance with OMB guidance	6,662
Travel	
■ A decrease of $485,000 in travel across the field offices and at Headquarters reflects a continuing effort to reduce travel in response to Congressional direction.	-485
Support Services	
■ A decrease of $1,315,000 in support service contracts at the Richland Operations Office is a result of a shift in priorities to fund essential site support activities.	-1,315

	FY 2000 vs FY 1999 ($000)
■ A decrease of $2,224,000 in support service contracts is the result of a $991,000 decrease in Headquarters support services and a $1,233,000 decrease in field (other than Richland) support services contracts consistent with continual Congressional direction to reduce the level of support services.	-2,224
Other Related Expenses	
■ An increase of $212,000 in other related expenses at the Idaho Operations Office reflects increased support for Federal employee training as well as upgrades to site telecommunications	212
■ An increase of $234,000 in other related expenses at the Ohio Field Office reflects increased support to Federal employee training as well as site-wide ADP upgrades. In addition, the increase will fund the additional rents and utilities requirements at the Mound Site	234
■ An increase of $1,411,000 in other related expenses at the Richland Operations Office reflects the increased requirements for new budget authority for rent and utilities as well as other essential activities. These activities were funded using prior year balances in FY 1999.	1,411
■ A decrease of $1,285,000 in other related expenses is the result of a $826,000 decrease in Headquarters and a $459,000 decrease in the rest of the field consistent with Congressional direction to reduce administrative expenses in direct support of Federal staff. This level of funding will reduce many areas to the minimum level of support such as supplies, Automated Data Processing (ADP), maintenance of office equipment, and critical equipment replacement.	-1,285
Total Funding Change, Program Direction	3,210

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Service [a]					
Feasibility of Design Considerations	30,818	29,867	28,065	-1,802	-6.0%
Economic and Environmental Analysis	13,638	12,617	11,719	-898	-7.1%
Test and Evaluation Studies	5,365	4,811	4,883	72	1.5%
Total, Technical Support Services	49,821	47,295	44,667	-2,628	-5.6%
Management Support Services [b]					
Management Studies	8,073	7,384	6,799	-585	-7.9%
Training and Education	1,404	816	746	-70	-8.6%
ADP Support	1,086	1,424	1,362	-62	-4.4%
Administrative Support Services	2,691	2,461	2,267	-194	-7.9%
Total, Management Support Services	13,254	12,085	11,174	-911	-7.5%
Subtotal, Support Services	63,075	59,380	55,841	-3,539	-6.0%
Use of Prior-Year Balances	-242	-4,934	0	4,934	-100.0%
Total, Support Services	62,833	54,446	55,841	1,395	2.6%

[a] Technical support services includes funding for services which include, but are not limited to, determining feasibility of design considerations; development of specifications, system definition, system review and reliability analyses; trade-off analyses; economic and environmental analyses which may be used in the Department of Energy's preparation of environmental impact statements; and test and evaluation, surveys or reviews to improve the effectiveness, efficiency and economy of technical operations.

[b] Management support services includes funding for services which include, but are not limited to, analyses of workload and work flow; directives management studies; automated data processing; manpower systems analyses; assistance in the preparation of program plans; training, and education; analyses of Department management processes; and any other reports or analyses directed toward improving the effectiveness, efficiency and economy of management and general administrative services.

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	5,425	4,159	4,261	102	2.5%
Working Capital Fund	7,212	6,706	7,210	504	7.5%
Printing and Reproduction	530	475	623	148	31.2%
Rental Space	6,812	7,797	7,469	-328	-4.2%
Software Procurement/Maintenance Activities/Capital Acquisitions	1,919	2,195	3,134	939	42.8%
Other [a]	26,467	18,870	18,077	-793	-4.2%
Subtotal, Other Related Expenses	48,365	40,202	40,774	572	1.4%
Use of Prior-Year Balances	-2,876	-3,340	0	3,340	0.0%
Total, Other Related Expenses	45,489	36,862	40,774	3,912	10.6%

[a] Other services category includes, but is not limited to, an assortment of the following cost and services: maintenance and repair of government vehicles and equipment; maintenance and renovations of buildings; janitorial and custodial services; stenographic reporting and typing; recruitments and advertisements; transit operations (shuttle bus); computer support hotline; Internet Services; alarm protection systems; employee health services; and other vendor services.

Environment, Safety And Health

Defense Environmental Restoration and Waste Management

Program Mission

The Office of Environment, Safety and Health (EH) is a corporate resource that provides leadership and Departmental management excellence to protect the workers, the public, and the environment. The Office of Environment, Safety and Health activities funded within the Defense Environmental Restoration and Waste Management appropriation are managed by a single office within EH in coordination with EH's ongoing program of studies and public health activities at DOE sites.

Public Health Activities include health studies, health education and promotion, and other public and occupational health related initiatives at DOE sites pursuant to a consolidated and coherent strategy which includes a public health agenda for each site. Additional funding for this initiative is found in the Other Defense Activities portion of this budget.

Program Goal

- Use health studies and public health activities to examine associations between exposures or conditions at DOE sites and potential adverse health effects among groups of workers and offsite populations to develop appropriate public health responses.

Program Objective

- Develop and implement, in partnership with the Department of Health and Human Services, a consolidated and coherent strategy for public health activities at DOE sites, which includes a public health agenda at each site.

Performance Measure

- Through studies of DOE community and worker populations, increased information defining the relationship between exposures resulting from DOE facility operation and their effects on human health and increased interventions to reduce harmful exposures to workers and community members.

Significant Accomplishments and Program Shifts

The Department has consolidated the management of Public Health Activities in the Office of Environment, Safety and Health to provide a focal point for ensuring that the results of these efforts are used for the maximum benefit of DOE workers and communities. The funding for these programs continues to be split between the Other Defense Activities and the Defense Environmental Restoration and Waste Management appropriations.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Public Health Activities	0[a]	12,000[b]	0	12,000	20,000[c]
Total, Public Health Activities	0	12,000	0	12,000	20,000

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
All Other Sites - Headquarters	0	12,000	20,000	+8,000	+66.7%
Total, All Other Sites - Headquarters	0	12,000	20,000	+8,000	+66.7%

[a]In FY 1998, the Office of Environmental Restoration and Waste Management Appropriation (EM) provided $4.8 million for Public Health Activities.

[b]In addition, $13.9 million for Public Health Activities was funded in the Other Defense Activities Appropriation section of the EH Budget.

[c]In addition, $13.825 million for Public Health Activities was funded in the Other Defense Activities Appropriation section of the EH Budget.

Health Studies

Mission Supporting Goals and Objectives

The Public Health Activities program promotes the health and safety of DOE's workers and communities surrounding Department sites, supports studies to understand the effects of radiation and other hazards associated with the DOE operations on humans, and promotes the wide dissemination of health-related information.

Public Health Activities support health studies, health education and promotion, and other public and occupational health related initiatives at DOE sites pursuant to a consolidated and coherent strategy which includes a public health agenda for each site. Community and worker health studies are conducted in partnership between DOE and the Department of Health and Human Services (HHS) under a Memorandum of Understanding (MOU). This program supports studies and other activities to assess the health of populations living near or working at DOE sites in order to determine if the health of workers and nearby communities has been impacted by DOE operations. Information from the health studies is communicated to the DOE workforce, line management and community stakeholders.

Significant Accomplishments

- Continue collaboration in public health activities conducted under the MOU with the Department of Health and Human Services, including environmental dose reconstruction projects at major DOE sites, single and multi-site cancer mortality studies of DOE workers, and community outreach and educational efforts. As part of this collaboration, develop a credible, coherent DOE/HHS public and occupational health agenda of activities at DOE sites. Conduct workshops and meetings with stakeholders as part of the agenda-setting process. (FY98: $0; FY99: $12,000; FY00: $20,000)

  As part of this program, the following commitment made in the Performance Agreement between the Assistant Secretary for Environment, Safety and Health and the Secretary of Energy has been accomplished:

  - Develop a coordinated health agenda with the Department of Health and Human Services that is responsive to stakeholder and customer needs.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Public Health Activities	0	12,000	20,000	+8,000	+66.7%
Total, Health Studies	0	12,000	20,000	+8,000	+66.7%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Public Health Activities			
■ Continue a coherent, coordinated program of occupational and community health studies at and around DOE sites under the Department of Health and Human Services (HHS) Memorandum of Understanding (MOU). As long-time DOE workers and residents near DOE facilities age, there will likely be an increased ability to detect late health effects of exposures associated with DOE operations. The results of a number of studies conducted to date have suggested the need for further research designed to help understand the long-term health impacts of exposure to low levels of radiation. The program of occupational and community studies conducted by HHS under its MOU with DOE offers an expanded basis upon which radiation protection standards and practices can be refined and improved. By engaging in a joint agenda setting process, DOE and HHS have worked together to develop a coherent, credible set of research priorities across the DOE complex. This agenda will be an invaluable tool in determining which studies are critical to pursue in both the near and long term. The size of DOE's FY 2000 request for such studies, which is larger than its budgets to fund this MOU over the past few fiscal years, will enable the Department to provide only about two-thirds of the level of funding for projects which HHS has recommended to DOE for FY 2000	0	12,000	20,000
Total, Public Health Activities	0	12,000	20,000

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Public Health Activities	
■ The agenda to prioritize funding for health studies of the various DOE sites is finalized and additional funding is needed to carry out this expanded agenda. . . .	+8,000
Total Funding Change, Public Health Activities	+8,000

Defense Facilities Closure Projects

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Defense Facilities Closure Projects

Proposed Appropriation Language

For expenses of the Department of Energy to accelerate the closure of defense environmental management sites, including the purchase, construction and acquisition of plant and capital equipment and other necessary expenses, [$1,038,240,000] *$1,054,492,000,* to remain available until expended. *Further, for the foregoing purposes, $1,054,492,000 to become available October 1, 2000, to remain available until expended. (Energy and Water Development Appropriations Act, 1999.)*

Explanation of Change

Changes in appropriation language provides for two year appropriation as required for Defense appropriations.

Defense Facilities Closure Projects

Site Closure

Program Mission

The Defense Facilities Closure Projects appropriation has a single account, Site Closure, which includes sites where the Environmental Management (EM) program plans to complete its DOE mission by the end of FY 2006. This account includes funding for projects under the Ohio Field Office in Ohio (i.e., Fernald Environmental Management, Miamisburg Environmental Management, the Ashtabula Environmental Management, and the Columbus Environmental Management projects), and the Rocky Flats Environmental Technology Site in Colorado.

In August 1997, the Secretary of Energy designated the Rocky Flats, Fernald, and Miamisburg sites as pilot sites for accelerated closure. The Energy and Water Development Appropriation Act for Fiscal Year 1998 expanded the EM Closure appropriation account to include all funding for the Fernald and Rocky Flats sites to encourage the acceleration of their closure. The Department of Energy included the remaining Ohio sites within this account in the FY 1999 budget request.

Program Goal

Accelerating cleanup and project completion is a central goal of the EM program. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, whereby all EM sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules. For those sites in the Site Closure account, the goal of the EM program is to complete the cleanup mission by FY 2006, after which no further Departmental mission is envisioned, except for limited long-term surveillance and maintenance, and the sites may be available for some alternative use.

Program Objectives

- Continue to accelerate cleanup efforts at sites and realize substantial savings by the resulting reduction in long-term program costs and ongoing support costs.
- Continue to sequence work at the Ohio sites to focus activities on the larger sites where most cost savings can be obtained through acceleration (Fernald and Miamisburg), while utilizing the remaining funding to focus on sequencing the completion of smaller sites.

Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected with the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Site Closure	995,885	1,038,240	0	1,038,240	1,054,492
Subtotal, Defense Facilities Closure	995,885	1,038,240	0	1,038,240	1,054,492
Y2K Supplemental	0	0	3,500	3,500	0
Total, Defense Facilities Closure Projects	995,885	1,038,240	3,500	1,041,740	1,054,492

Public Law Authorization:

Public Law 95-91, Department of Energy Organization Act (1977)

Public Law 103-62, "Government Performance and Results Act of 1993"

Public Law 105-245, The Energy and Water Development Appropriations Act, Fiscal Year 1999

Public Law 105-261, Strom Thurmond National Defense Authorization Act For Fiscal Year 1999

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Ohio Field Office	363,785	381,040	397,282	16,242	4.3%
Rocky Flats Field Office	632,100	657,200	657,210	10	>999.9%
Total, Site Closure	995,885	1,038,240	1,054,492	16,252	1.6%

Ohio

Mission Supporting Goals and Objectives

Program Mission

The mission of the Defense Facilities Site Closure Environmental Management program managed through the Ohio Field Office is to support cleanup activities at four sites in the State of Ohio. These sites are: the Fernald Environmental Management Project; the Miamisburg Environmental Management Project; the Columbus Environmental Management Project; and the Ashtabula Environmental Management Project sites. The Ohio Field Office manages, coordinates, tracks, and assists in the implementation of the cleanup program among the various sites.

Program Goal

The goal of the Ohio Field Office sites is the transfer of real property to the state or local communities by completing environmental restoration and waste management projects by 2006, with a minimal but adequate level of long-term stewardship continuing after that point.

Program Objectives

The objectives for the Ohio sites will be to continue safe shutdown; decontaminate and decommission buildings; disposition contaminated soil, debris and waste material to an off-site disposal cell or on-site, if appropriate; and accelerate groundwater cleanup through innovative technology deployment. This initiative depends on a variety of factors, including community needs, regulatory requirements, and technical feasibility. The Ashtabula Environmental Management Project site will be released for unrestricted use and returned to RMI Company; the Columbus Environmental Management Project site will be transferred to Battelle Laboratories for unrestricted use; the Fernald Environmental Management Project site will be completed and placed under institutional control; and the Miamisburg Environmental Management Project site will be transferred to the City of Miamisburg.

Performance Measures

Performance measures are provided at an aggregate level after the Funding by Site table as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

Ashtabula Environmental Management Project

- Initiated design work, prepared for construction of the Soil Cleaning Plant, (FY 1998); complete construction and initiate operation (FY 1999) for processing Phase I contaminated soil.
- Initiated building deactivation (FY 1998) and initiate remediation (FY 1999).
- Completed Area D soil remediation (FY 1998) and continue low level waste and legacy waste shipments for disposal (FY 1999).
- Complete the remediation of three buildings at the Ashtabula site (RMI) and transport and dispose of 885 cubic meters of waste. In addition, innovative technologies are being deployed that will accelerate the cleanup of groundwater and soil by approximately two years (FY 2000)

Columbus Environmental Management Project

- Initiated (FY 1998) and continue (FY 1999) transuranic waste processing.
- Initiated interior decontamination of the West Jefferson building JN-1 (FY 1998); continue efforts (FY 1999), including material and equipment removal.
- Provided required core environmental and surveillance and maintenance activities, which included facility structural/hazard analysis of major building systems (FY 1998).
- Initiated (FY 1998) and continue (FY 1999) shipments of low level waste.
- Initiate the decontamination of two buildings at Battelle Columbus Lab including transuranic waste processing and associated equipment removal; and remediate soils from external areas at the site (FY 2000).

Fernald Environmental Management Project

- Initiated construction of South Field Extraction System Pipeline (FY 1998) and began excavation of contaminated soil (FY 1998).
- Completed Advanced Waste Water Treatment expansion (FY 1998) and initiate treatment of site waste water and groundwater monitoring (FY 1999).
- Completed construction of Sewage Treatment Plant (FY 1998).
- Completed onsite rail construction, offsite rail upgrade, and purchased unit trains for Waste Pits Project remediation (FY 1998).
- Completed Plant 2, 3, and 8 safe shutdown (FY 1998).
- Continue safe storage of nuclear materials onsite and continue disposition of remaining low enriched nuclear material and depleted inventories (FY 1998/FY 1999).
- Continue low level and mixed waste disposition (FY 1998/FY 1999).
- Initiate and complete excavation and removal of the inactive flyash pile excavation (FY 1999).
- Initiate processing and shipping of waste for offsite disposal for Waste Pit Remedial Actions Project (FY 1999).

- Initiated waste placement in Cell 1 and completed construction of the liner for Cell 2 (FY 1998); continue waste placement, including decontamination and decommissioning debris in Cell 1 and Cell 2 of the On Site Disposal Facility, and initiate construction of the liner for Cell 3 (FY 1999).
- Complete decontamination and decommissioning of Boiler Plant and Plant 9 (FY 1999).
- Award subcontracts for decontamination and decommissioning of Plant 5 and 6 complexes (FY 1999).
- Award Silo 3 subcontract; complete proof of principle testing and accelerated waste retrieval for silos 1 and 2 (FY 1999).
- The DOE and the Environmental Protection Agency signed a dispute resolution settlement agreement for the Fernald Environmental Management Program which assessed a monetary penalty of $100,000 to be paid in FY 1999.
- Continue safe shutdown of the former Fernald production operations facilities; decontaminate and decommission Plant 1,3, and 5 complexes; continue transportation of contaminated building debris, soil, and waste pits remediated media to the On-site Disposal Facility; continue media restoration of the Great Miami Aquifer through extraction/injection; initiate construction of the Fernald Silo 3 recover and treatment facility; and complete the design of Silos 1 and 2 retrieval and treatment facility (FY 2000).

Miamisburg Environmental Management Project

- Completed three release site cleanups and three release site assessments (FY 1998); complete three release site assessments (FY 1999).
- Completed safe shutdown of 25 buildings in FY 1998, and complete an additional one in FY 1999.
- Completed 22 facilities assessments and 19 decommissionings (FY 1998); complete an additional four assessments and four decommissionings (FY 1999).
- Completed disposal of all accountable tritium inventory (FY 1998).
- Complete shipment of 7 kg of nuclear materials to receiver sites (FY 1999).
- Completed transport and disposal of 2,200.0 m^3 of low level waste (FY 1998); and complete transport and disposal of 19.0 m^3 of mixed low level waste and 5,399.0 m^3 of low level waste (FY 1999).
- Continue decontamination and decommissioning of the Mound tritium complex (the "critical path"); and continue the remediation and transfer of buildings to the City of Miamisburg (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-CL-OH / Security Investigations	0	94	94	0	>999.9%
OH-AB-01 / Remediation	9,757	10,393	10,643	250	2.4%
OH-AB-02 / Project Management, Site Services, ES&H	4,880	5,012	4,762	-250	-5.0%
OH-CL-02-D / West Jefferson Site Decontamination (Defense Funded)	2,773	2,000	6,000	4,000	200.0%
OH-CL-03-D / Project Management, Site Support & Maintenance	2,045	1,593	2,841	1,248	78.3%
OH-FN-01 / Facility Shutdown	44,744	29,211	25,125	-4,086	-14.0%
OH-FN-02 / Facility D&D	9,206	13,794	17,689	3,895	28.2%
OH-FN-03 / On-Site Disposal Facility	15,113	16,264	19,438	3,174	19.5%
OH-FN-04 / Aquifer Restoration	22,811	24,974	24,296	-678	-2.7%
OH-FN-05 / Waste Pits Remediation Project	44,056	46,147	48,840	2,693	5.8%
OH-FN-06 / Soils	12,760	19,532	15,654	-3,878	-19.9%
OH-FN-07 / Silos	22,654	17,545	33,922	16,377	93.3%
OH-FN-08 / Nuclear Materials	3,800	3,167	2,121	-1,046	-33.0%
OH-FN-10 / Mixed Waste	9,020	5,279	5,786	507	9.6%
OH-FN-11 / Waste Management	15,333	19,489	14,910	-4,579	-23.5%
OH-FN-12 / Program Support & Oversight	59,203	78,600	72,808	-5,792	-7.4%
OH-MB-01 / Tritium Operations Transition	16,040	0	0	0	>999.9%
OH-MB-02 / Main Hill Tritium	12,157	33,413	35,266	1,853	5.5%
OH-MB-03 / Legacy Waste	7,345	14,434	7,199	-7,235	-50.1%
OH-MB-04 / Main Hill Rad	3,156	3,357	4,006	649	19.3%
OH-MB-05 / Main Hill Non Rad	4,105	2,776	2,768	-8	-0.3%
OH-MB-06 / Special Metals/Plutonium Processing Hill	5,026	2,526	6,617	4,091	162.0%
OH-MB-07 / Test Fire Valley	4,329	4,513	7,157	2,644	58.6%
OH-MB-08 / Soils	13,046	6,928	3,097	-3,831	-55.3%
OH-MB-09 / Facility Operations & Maintenance	19,057	19,191	19,038	-153	-0.8%
OH-MB-10 / Exit Support Project	1,369	808	7,205	6,397	791.7%
Total, Ohio	363,785	381,040	397,282	16,242	4.3%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Ashtabula	14,637	15,405	15,405	0	>999.9%
Columbus	4,818	3,593	8,841	5,248	146.1%
Fernald	258,700	274,002	280,589	6,587	2.4%
Miamisburg	85,630	87,946	92,353	4,407	5.0%
Ohio Field Office	0	94	94	0	>999.9%
Total, Ohio	363,785	381,040	397,282	16,242	4.3%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	3.0	3.0	3.0
Cleanups	3.0	0.0	6.0
Remediation Waste			
Generated	0.0	221,871.0	148,226.0
Facility Deactivation			
Completed Deactivations	38.0	6.0	13.0
Not yet deactivated/monitored	119.0	105.0	92.0
In Post Deactivation Monitoring	1.0	0.0	0.0
Facility Decommissioning			
Assessments	22.0	8.0	14.0
Cleanups	21.0	11.0	14.0
Nuclear Material Stabilization			
Made Disposition Ready - Other Forms of NM	2.0	23.0	2.0
Made Disposition Ready - Pu Metal/Oxides/Other	2.0	2.0	0.0
Made Disposition Ready Onsite - U Other Forms	0.0	7.0	0.0
Made Disposition Ready Ship Offsite - U Other Forms	204,002.1	4,386,000.0	2,609,000.0
Transuranic Waste (TRU)			
Storage (m^3)	247.0	247.0	247.0
Mixed Low-Level Waste (MLLW)			
Treatment	104.6	0.0	0.0
Storage	19.0	0.0	0.0
Disposal - DOE Onsite/Commercial (m^3)	0.0	531.8	13.2

	FY 1998	FY 1999	FY 2000
Low Level Waste (LLW)			
Treatment	0.0	1,500.0	1,000.0
Storage	28,728.0	4,202.0	1,220.0
Ship to DOE Disposal Site	2,649.0	8,895.0	9,293.0
DOE Onsite/ Commercial (m^3)	0.0	9,591.0	3.0

Site Description

Fernald Environmental Management Project

The Fernald Environmental Management Project site encompasses approximately 1,050 acres, located 17 miles northwest of Cincinnati, Ohio. High-purity uranium metal products were produced at the Fernald Environmental Management Project site for the DOE and its predecessor agencies from 1951 to 1989. Thorium was also processed, but on a smaller scale, and is still stored on-site. Uranium processing operations at the Fernald Environmental Management Project were limited to a fenced, 136-acre tract known as the Production Area. In November 1989, the Environmental Protection Agency placed the Fernald Environmental Management Project site on the National Priorities List, and in April 1990 DOE and the Environmental Protection Agency entered into a Consent Agreement (since amended) for site remediation. The Consent Agreement created five Operable Units covering total site remediation. The Fernald Environmental Management Project has implemented an accelerated cleanup schedule which provides for site closure, with the completion of the currently established in-situ contaminant source remediation and risk mitigation activities, by FY 2005. The in-situ contaminant sources for Operable Unit 1, Operable Unit 2, Operable Unit 3, and Operable Unit 5 will be removed and appropriately disposed of by FY 2005. In addition, the extraction and treatment infrastructure required to contain and mitigate risks associated with contaminated groundwater will be fully in place. Follow-up activities for FY 2006 through FY 2008 include finalization of treatment and disposal of Silos 1 and 2 wastes and structures per the Operable Unit 4 Record of Decision amendment. The Fernald Environmental Management Project will utilize technologies such as a new inorganic treatment process to treat PCB contaminated low-level and mixed low level waste (Tri-Mixed Treatment Demonstration), Oxy-gasoline torch cutting, vacuum removal of insulation materials, process piping interior inspection, and a technology demonstration project (injection of treated groundwater) that may reduce the groundwater remediation schedule from 27 to 10 years. Fernald Environmental Management Project is in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980; the Federal Facility Compliance Agreement; the Resource Conservation and Recovery Act; the National Energy Policy Act; and all regulatory requirements.

Ashtabula Environmental Management Project

The Ashtabula Environmental Management Project site, located in Ashtabula, Ohio, is owned and operated by the RMI Company, and is contaminated with both radiological and hazardous materials resulting from previous operations for the DOE to shape radioactive materials. The Ashtabula Environmental Management Project is comprised of three release sites and 25 buildings. The cleanup plan requires decontamination and decommissioning of buildings and the remediation of contaminated soils and groundwater to allow unrestricted use of the site. The Ashtabula Environmental Management Project goal is to achieve completion by FY 2003, with an associated life-cycle reduction in cost of $48,600,000 from the costs projected in the FY 1996 Baseline Environmental Management Report. Most of the cost reduction is due to the ability to treat and reduce the volume of contaminated waste (using the soil treatment system for soil remediation) that must be shipped off-site to a disposal facility. Ashtabula Environmental Management Project is in compliance with Nuclear Regulatory Commission and other regulatory requirements. Upon completion, the site will be released to the RMI Company. Post-completion, long term groundwater pump and treat operations will continue until FY 2018.

Columbus Environmental Management Project

The Columbus Environmental Management Project is comprised of two geographic sites (King Avenue and West Jefferson) located in and near Columbus, Ohio. Research and development work was performed at these facilities for the DOE and its predecessors agencies. The buildings are privately-owned by Battelle Memorial Institute. The facilities retain an active Nuclear Regulatory Commission license for possession of special nuclear material and are in compliance with all necessary regulatory requirements. Both sites are radioactively-contaminated and cleanup efforts are funded by both the Defense and Non-Defense accounts. The Columbus Environmental Management Project consists of 17 facilities and two release sites, of which 13 facilities cleanups were completed by the end of FY 1998. Decontamination activities at West Jefferson were initiated in FY 1998. Activities at the West Jefferson site should be completed by FY 2006 and the site returned to the private owner.

Miamisburg Environmental Management Project

The Miamisburg Environmental Management Project manages the Mound Plant, which is located on 306 acres in Miamisburg, Ohio, ten miles south of Dayton. The Miamisburg Environmental Management Project is predominately funded from the Defense Facilities Closure Projects appropriation, but does receive some funds from the Non-Defense Environmental Management appropriation. The plant was built in the late 1940's to support research and development, testing and production activities for the Department's defense nuclear weapons complex and energy research programs. This mission continued until 1994, when these activities were transferred to other DOE facilities. The Mound Plant mission involved production of components which contained plutonium-238, polonium-210 and tritium, and processing large quantities of various types of high explosives. As a result of these past operations, the buildings, soil, and groundwater are contaminated with radioactive and hazardous chemicals. The only remaining mission at Mound is the production of plutonium heat sources and Radioisotopic Thermoelectric Generators (RTG's) by the Office of Nuclear Energy primarily for National Aeronautics and Space Administration space missions and other customers. The

Office of Nuclear Energy is in the process of deciding whether to keep this activity at Mound or to relocate it elsewhere within the DOE complex. The Miamisburg Environmental Management Project is on the Environmental Protection Agency National Priority List, and a Federal Facility Agreement to remediate the site has been negotiated with the Ohio and U.S. Environmental Protection Agencies . The Miamisburg Environmental Management Project is comprised of 416 release sites and 111 facilities. In FY 2000, Miamisburg Environmental Management Project will continue to clean up the buildings and soil at the site with the goal of disposition of the real property by the year 2005 or earlier. The Department is working with stakeholders and regulators for the transfer of site ownership to the Miamisburg Mound Community Improvement Corporation upon completion of required cleanup activities. The Miamisburg Environmental Management Project is in compliance with all necessary regulatory requirements.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The Ohio projects are managed through incentivized contracts based on performance and utilize fixed-price subcontracts to assure the most efficient service to the Government. This scope planned for FY 2000 has been reviewed and is consistent with the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. The Ohio projects included in this section of the budget have had independent reviews of their baseline scopes and costs. The scope and funding requested for FY 2000 are consistent with the activities that have been reviewed.			
HQNP-SI01-CL-OH/Security Investigations			
Funding will be used to perform new security investigations and re-investigations for non-federal employees in accordance with DOE Order requirements for the Ohio/Mound site.			
HQNP-S101-CL-OH	0	94	94

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OH-AB-01/Remediation			
The purpose of this project is to remediate the RMI Company Extrusion facility, which involves deactivation of 25 on-site buildings, and decontamination or demolition of 21 on-site buildings and associated equipment. Also included in this project is the processing/treatment of low level and mixed low level radioactive contamination resulting from decontamination and excavation activities and vapor stripping of groundwater to remove hazardous constituents.			
■ Remediate 3 buildings.			
■ Dispose of 885 m^3 of remediation waste.			
■ 11,200 m^3 of soil treated and returned on site.			
OH-AB-01	9,757	10,393	10,643

Metrics			
Facility Deactivation			
Deactivated during period	10.0	3.0	0.0
Not yet deactivated	15.0	12.0	12.0
Facility Decommissioning			
Cleanups	0.0	0.0	3.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	1.0	0.0	0.0
Disposal - DOE Onsite/Commercial (m^3)	0.0	2.8	11.2
Remediation Waste Generated	0.0	468.1	884.9
Low Level Waste (LLW)			
Disposal - DOE Onsite/ Commercial (m^3)	0.0	0.0	3.0
Ship to DOE Disposal	59.0	166.0	0.0

OH-AB-02/Project Management, Site Services, ES&H			
This project provides the management, control, and services necessary to ensure the decommissioning of the RMI Company Extrusion Plant site is conducted in the safest and most cost effective manner, while maintaining compliance with all applicable statutes, contracts, and regulations.			
■ Obtain Nuclear Regulatory Commission Free-Release for Area C and Area C-West.			
■ Publication of the Annual Site Environmental Report.			
OH-AB-02	4,880	5,012	4,762

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
No quantifiable corporate performance measures are associated with this project.			

OH-CL-02-D/West Jefferson Site Decontamination

This project involves facility decommissioning at the West Jefferson site, including a Hot Cell building and a retired research reactor which requires quality assurance, waste management, and health and safety support during decommissioning. Upon completion, buildings will be demolished and grounds will be returned to Battelle for reuse without radiological restriction.

- Initiate decontamination operations within JN-2, JN-3, and on the external areas at the site.
- Continue transuranic waste volume reduction utilizing the Sonatol System and associated material and equipment removal.
- Continue health and safety support and emergency preparedness.
- Make associated shipments of 177 m^3 of low level waste.
- Prepare 100 m^3 of transuranic waste disposal-ready for shipment to the Waste Isolation Pilot Plant.

OH-CL-02-D	2,773	2,000	6,000
Metrics			
Remediation Waste (m^3)			
Generated	0.0	35.0	283.0
Low Level Waste (LLW)			
Disposal - Ship to DOE Disposal (m^3)	35.0	72.0	177.0

OH-CL-03-D/Project Management, Site Support, & Maintenance

The scope of this project is to provide technical support to the field work involved in the two related decontamination projects (King Avenue and West Jefferson sites), including surveillance and maintenance, project management and regulatory compliance.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue to provide required core environmental activities and surveillance and maintenance activities, including facility structural/hazard analysis of major building systems.			
■ Provide program management support for increased work activities, including public affairs, regulatory compliance, quality assurance, and project management.			
OH-CL-03-D	2,045	1,593	2,841

Metrics
No quantifiable corporate performance measures associated with this project.

OH-FN-01/Facility Shutdown

The objective of this project is to complete safe shutdown of the former production operations/facilities, eliminating the potential release of radiological and chemical contaminants to the soil and groundwater. The equipment and materials from the facilities will be removed and placed in the On-Site Disposal Facility, and all facilities will be dismantled.

- Continue base services activities, including safety and health, emergency management, fire protection, radiological control, and environmental monitoring in support of restoration activities.
- Continue facility shutdown activities for non-nuclear facilities.

OH-FN-01	44,744	29,211	25,125

Metrics			
Facility Deactivation			
Completed Deactivations	3.0	2.0	0.0
Remediation Waste (m^3)			
Generated	0.0	138.0	71.0
Low Level Waste (LLW)			
Disposal - DOE Onsite/ Commercial (m^3)	0.0	3,872.0	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OH-FN-02/Facility D&D			
This project addresses the decontamination and decommissioning of over 200 above-grade structures in the former production area (Operable Unit 3), including preparatory actions prior to decontamination and decommissioning, such as removal of process residues, waste, nuclear product inventories, disconnecting utilities, and general gross decontamination. Following removal of above-grade structures, this project will also conduct soil remediation under those structures.			
■ Complete decontamination and decommissioning of Maintenance/Complex.			
■ Continue decontamination and decommissioning for Plant 3, 5 and 6 Complexes.			
■ Continue transportation of decontamination and decommissioning debris to On-Site Disposal Facility transfer area.			
OH-FN-02	9,206	13,794	17,689
Metrics			
Facility Decommissioning			
Cleanups	1.0	3.0	1.0
Low Level Waste (LLW)			
Disposal - Ship to DOE Disposal (m^3)	0.0	578.0	298.0
OH-FN-03/On-Site Disposal Facility			
The On-Site Disposal Facility project provides for disposal of the waste generated as a result of site remediation at Fernald. It will have eight disposal cells, and a ninth, contingent cell, for acceptance of up to 2.5 million cubic yards of volume that meets established waste acceptance criteria. It also funds support facilities, receipt and placement of wastes and impacted materials, facility closure and post-closure monitoring and maintenance.			
■ Complete permanent cap for Cell 1.			
■ Complete waste placement in Cell 2 of On-Site Disposal Facility, and complete installation of liner for Cell 3.			
OH-FN-03	15,113	16,264	19,438

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Remediation Waste (m^3)			
Generated	0.0	174,788.0	71,534.0
Low Level Waste (LLW)			
Disposal - DOE Onsite/ Commercial (m^3)	0.0	1,891.0	0.0

OH-FN-04/Aquifer Restoration

This project is designed to confine and extract uranium contamination from the Great Miami Aquifer, a sole source aquifer that underlies the Fernald site. The activity was planned to continue out through 2020, but with improved technology, may be accelerated with estimated completion before 2012. Site-wide management of storm water, wastewater, sanitary sewage treatment and groundwater monitoring are all included in the scope of this project.

- Continue groundwater monitoring, plugging, and abandonment, sampling and reports.
- Continue extraction/injection operations and maintenance.
- Continue operation of water treatment systems, groundwater monitoring, and South Plume Well Field.

OH-FN-04	22,811	24,974	24,296
Metrics			
Remediation Waste (m^3)			
Generated	0.0	460.0	460.0

OH-FN-05/Waste Pits Remediation Project

This project will excavate, package, and ship to an off-site, permitted commercial disposal facility, material from the waste pits in Operable Unit 1 and other selected material that will not meet waste acceptance criteria for the on-site disposal cell.

- Continue waste processing and shipping for the Waste Pits project to an off-site, permitted commercial disposal facility.

OH-FN-05	44,056	46,147	48,840

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Remediation Waste (m^3)			
Generated	0.0	40,629.0	62,114.0
Low Level Waste (LLW)			
Disposal - Ship to DOE Disposal (m^3)	0.0	555.0	786.0

OH-FN-06/Soils

The purpose of the Soil Characterization and Excavation Project is to develop and execute the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 remedial design, excavation, characterization and restoration of soil and other solid materials impacted by production operations and other activities conducted at the Fernald Environmental Management Facility. There are several areas of soil restoration that are broken up into multiple phases and units.

- Continue Southern Waste Unit excavation.
- Complete excavation of Area I, Phase II.
- Complete Lime Sludge Pond excavation.

OH-FN-06	12,760	19,532	15,654
Metrics			
Remediation Waste (m^3)			
Generated	0.0	1,471.0	5,122.0

OH-FN-07/Silos

This project will treat the wastes contained in Silos 1, 2 and 3, and dispose of the wastes at the Nevada Test Site and/or a permitted, commercial disposal facility.

- Continue Silo 3 pre-operations/treatment activities.
- Complete design of Tank Transfer Area/Waste Retrieval System and Radon Control System and initiate construction of Tank Transfer Area Waste Retrieval System and Radon Control System for Silos 1 and 2.

OH-FN-07	22,654	17,545	33,922

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OH-FN-08/Nuclear Materials			
This project provides for the disposition of approximately 15.6 million pounds of low enriched, normal, and depleted uranium left from the shutdown of the processing facilities.			
■ Continue nuclear materials disposition.			
OH-FN-08	3,800	3,167	2,121
Metrics			
Nuclear Material Stabilization			
Made Disposition Ready Ship Offsite - U Other forms (kg Bulk)	204,000.0	4,386,000.0	2,609,000.0
OH-FN-10/Mixed Waste			
This project will treat or process legacy and newly generated mixed waste to meet the requirement for off-site disposal, and includes scope for the disposition of hazardous waste generated during routine operations. The scope includes stabilization, treatment of process residues, disposal of polychlorinated biphenyl contaminated waste, and treatment and disposal of hazardous solutions and chemicals, motor oil, and wastes not specifically covered in other projects.			
■ Continue mixed waste disposition.			
■ Start up of mixed waste organic extraction project.			
OH-FN-10	9,020	5,279	5,786
Metrics			
Remediation Waste (m^3)			
Generated	0.0	254.0	44.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	102.6	0.0	0.0
Disposal - DOE Onsite/Commercial (m^3)	0.0	510.0	0.0
Low Level Waste (LLW)			
Disposal - Ship to DOE Disposal (m^3)	0.0	4,833.0	1,122.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OH-FN-11/Waste Management			
This project encompasses the characterization, minimization, recycling, treatment, storage, and disposal for existing low level and sanitary wastes. It also includes program oversight and coordination of all organizations (including silo project) generating waste on site.			
■ Continue low level waste disposition.			
OH-FN-11	15,333	19,489	14,910
Metrics			
Low Level Waste (LLW)			
Storage - Total (m^3)	23,900.0	4,202.0	1,220.0
Treatment (m^3)	0.0	1,500.0	1,000.0
Disposal - Ship to DOE Disposal (m^3)	355.0	1,120.0	4,910.0
OH-FN-12/Program Support & Oversight			
This project includes the program management and oversight activities to support the remediation of Fernald. It also provides for regulatory oversight and ongoing litigation costs. Activities include project planning, monitoring, reporting and scheduling. Program support functions include space management, program services, human resources, finance, contract and asset management, records/information/total quality management. Oversight and program integration functions include programmatic cost and budget, program services, safety and health, project controls, emergency services, environmental compliance, and quality assurance.			
■ Continue project management and administrative activities.			
OH-FN-12	59,203	78,600	72,808
Metrics			
No quantifiable corporate performance measures are associated with this project.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OH-MB-01/Tritium Operations Transition			
This project was designed to remove excess legacy materials, primarily tritium gas, from Miamisburg so that decontamination and decommissioning may proceed. Major objectives were to load all remaining tritium gas into transport vessels for shipment to Savannah River, repackage all "special" units and ship to Los Alamos National Laboratory for processing or shipment to alternate site for temporary storage, complete repackaging and shipment of excess plutonium, uranium and other sources to receiver sites, and complete characterization, repackaging, and shipment of miscellaneous excess isotopes to Nevada Test Site.			
■ Project is complete.			
OH-MB-01	16,040	0	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
OH-MB-02/Main Hill Tritium			
This project provides for the safe shutdown and removal or decontamination of tritium contaminated equipment, duct work, and chemical mixtures in four buildings, so they may be released for reuse or demolished.			
■ Full scale efforts will be devoted to the decontamination of the four major buildings that comprise the tritium complex, which is on the critical path.			
OH-MB-02	12,157	33,413	35,266
Metrics			
Facility Deactivation			
Not Yet Deactivated/Monitored	3.0	3.0	3.0
OH-MB-03/Legacy Waste			
This project focuses on low-level, mixed low-level and transuranic wastes. The goal is to treat and dispose each waste stream from the Miamisburg site.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Transuranic waste will be characterized and repackaged for interim storage or made disposal-ready for shipment to the Waste Isolation Pilot Plant.			
■ Excess nuclear materials will be removed from site.			
■ Continue low-level and mixed low-level waste disposition.			
OH-MB-03	7,345	14,434	7,199

Metrics			
Remediation Waste (m^3)			
Generated	0.0	3,628.0	7,714.0
Transuranic Waste (TRU)			
Storage (m^3)	247.0	247.0	247.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	1.0	0.0	0.0
Storage (m^3)	19.0	0.0	0.0
Disposal - DOE Onsite/Commercial (m^3)	0.0	19.0	2.0
Low Level Waste (LLW)			
Storage - (m^3)	4,828.0	0.0	0.0
Disposal - Ship to DOE Disposal Site (m^3)	2,200.0	1,571.0	2,000.0
Disposal - DOE Onsite/ Commercial (m^3)	0.0	3,828.0	0.0
Nuclear Material Stabilization			
Made Disposition Ready Pu Metal/Oxides/Other (Cont)	2.0	2.0	0.0
Made Disposition Ready Onsite - U Other Forms (Kg Bulk)	0.0	7.0	0.0
Made Disposition Ready Ship Offsite - U Other Forms (Kg Bulk)	2.1	0.0	0.0
Made Disposition Ready - Other Forms of NM (Cont)	2.0	23.0	2.0

OH-MB-04/Main Hill Rad

The Main Hill Rad project involves the decommissioning of eight buildings and resulting release of property for non-DOE industrial use. The buildings identified for demolition are the research, semi-works, cafeteria, semi-works filter bank, B Stack, the E & E Annex (environmental lab), and the H building (laundry and change room).

- Complete safe shutdown of E and E Annex environmental laboratory.

OH-MB-04	3,156	3,357	4,006

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Deactivation			
Completed Deactivations	1.0	0.0	1.0
In Post-Deactivation Monitoring	1.0	0.0	0.0
Not Yet Deactivated/Monitored	5.0	5.0	4.0
Facility Decommissioning			
Assessments	1.0	0.0	1.0
Cleanups	1.0	0.0	0.0

OH-MB-05/Main Hill Non Rad

This project provides for the evaluation and release or demolition of over 30 buildings located primarily on the Main Hill, but also includes infrastructure support buildings located elsewhere on site. These buildings are not on the Exit Plan Critical Path, and can therefore be completed in parallel with other site activities.

- Complete safe shutdown and demolish or transfer nine non-rad contaminated buildings.

OH-MB-05	4,105	2,776	2,768

Metrics			
Facility Deactivation			
Completed Deactivations	3.0	1.0	10.0
Not Yet Deactivated/Monitored	29.0	28.0	18.0
Facility Decommissioning			
Assessments	2.0	4.0	9.0
Cleanups	2.0	3.0	9.0

OH-MB-06/Special Metals/Plutonium Processing Hill

This project involves the decontamination and decommissioning or demolition of 22 building structures, one water tower, one air emission stack, site restoration work and the resulting release of property for non-government industrial use.

- Complete 50% of decontamination work on a major contaminated building (Building 38), and complete facility assessments on three other buildings.

OH-MB-06	5,026	2,526	6,617

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Deactivation			
Completed Deactivations	9.0	0.0	0.0
Not Yet Deactivated/Monitored	12.0	12.0	12.0
Facility Decommissioning			
Assessments	12.0	2.0	3.0
Cleanups	10.0	3.0	0.0

OH-MB-07/Test Fire Valley

The purpose of this project is to make approximately 67 buildings releasable for local industrial use or demolish them depending on the cost or need for reuse. The most radiologically contaminated buildings will be scheduled earliest for decontamination.

- Continue decontamination of two rad-contaminated buildings.
- Complete assessment and cleanup of Explosives Preparation Facility.

OH-MB-07	4,329	4,513	7,157

Metrics			
Facility Deactivation			
Completed Deactivations	12.0	0.0	2.0
Not Yet Deactivated/Monitored	55.0	45.0	43.0
Facility Decommissioning			
Assessments	7.0	2.0	1.0
Cleanups	7.0	2.0	1.0

OH-MB-08/Soils

This project addresses approximately 73 soil sites known or suspected as being contaminated. The purpose is to eliminate the threat from radionuclide, petroleum, and solvent contamination.

- Continue soil vapor extraction and pump and treat.
- Complete cleanup on six release sites.

OH-MB-08	13,046	6,928	3,097

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Release Sites			
Assessments	3.0	3.0	3.0
Cleanups	3.0	0.0	6.0

OH-MB-09/Facility Operations & Maintenance

The project scope ensures the site's facilities, infrastructure and utilities are maintained in a manner conducive to the ultimate site disposition, while at the same time ensuring the environment, safety and health of the site's workers and the local community.

- Support site engineering, facility and utility services.

OH-MB-09	19,057	19,191	19,038

Metrics
No quantifiable corporate performance measures are associated with this project.

OH-MB-10/Exit Support Project

This project contains all costs associated with state and Federal Environmental Protection Agency oversight of the site remediation activities; legal expenses; and Defense Contract Audit Agency audit support.

- Continue regulatory oversight, legal expenses and Defense Contract Audit Agency support.

OH-MB-10	1,369	808	7,205

Metrics
No quantifiable corporate performance measures are associated with this project.

Total, Ohio	363,785	381,040	397,282

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OH-AB-01/Remediation	
■ Increase is due to funding for the Building Remediation Subcontract for demolition and shipment of debris.	250
OH-AB-02/Project Management, Site Services, ES&H	
■ Decrease is due to anticipated reduction of workforce used to install ground water treatment technology, and due to cost efficiencies.	-250
OH-CL-02-D/West Jefferson Site Decontamination (Defense Funded)	
■ Increase is due to initiation of decontamination operations within JN-2, JN-3, and on the external areas at the site.	4,000
OH-CL-03-D/Project Management, Site Support and Maintenance	
■ Increase is due to project management and site support for the increased work scope of decontamination operations at the West Jefferson Site.	1,248
OH-FN-01/Facility Shutdown	
■ Decrease is due to completion of nuclear facility safe shutdown efforts in FY 1999.	-4,086
OH-FN-02/Facility D&D	
■ Increase is due to the move from safe shutdown to decontamination and decommissioning, such as Plant 5, Plant 6, and Maintenance/Tank Farm Complex.	3,895
OH-FN-03/On-Site Disposal Facility	
■ Increase is due to acceleration of On-Site Disposal Facility construction.	3,174
OH-FN-04/Aquifer Restoration	
■ Decrease is due to completion of the Lab Relocation project in FY 1999.	-678
OH-FN-05/Waste Pits Remediation Project	
■ Increase is due to additional volumes of waste processed and shipped for Waste Pits Remediation Project.	2,693
OH-FN-06/Soils	
■ Decrease is due to reduced remaining levels of soils to be excavated	-3,878
OH-FN-07/Silos	
■ Increase is due to Silo 3 subcontract award and increased construction activities for Silos 1 and 2.	16,377
OH-FN-08/Nuclear Materials	
■ Decrease reflects reduced levels of nuclear materials disposition	-1,046

	FY 2000 vs. FY 1999 ($000)
OH-FN-10/Mixed Waste	
■ Increase is due to the startup of the Mixed Waste Organic Extraction Project	507
OH-FN-11/Waste Management	
■ Decrease is due to reduced levels of low level waste disposition	-4,579
OH-FN-12/Program Support & Oversight	
■ Decrease reflects the reduction in the number of buildings requiring safety and monitoring systems to run them, resulting in lower program support and oversight costs.	-5,792
OH-MB-02/Main Hill Tritium	
■ Increase is due to greater manhours assigned to Area 1 (building services) in decontamination of T building and contaminated areas of R building.	1,853
OH-MB-03/Legacy Waste	
■ Decrease is due to the reduction of legacy waste inventory and the monitoring activities associated with the storage.	-7,235
OH-MB-04/Main Hill Rad	
■ Increase is due to waste management support with demolition of facilities and due to volume of remediation waste generated.	649
OH-MB-05/Main Hill Non Rad	
■ Funding level is essentially stable.	-8
OH-MB-06/Special Metals/Plutonium Processing Hill	
■ Increase is due to greater efforts for decontamination work on building 38	4,091
OH-MB-07/Test Fire Valley	
■ Reflects increased efforts on decontamination of HH and WD buildings	2,644
OH-MB-08/Soils	
■ Decrease reflects facility completions and reduced activities associated with release sites.	-3,831
OH-MB-09/Facility Operations & Maintenance	
■ Funding is essentially stable.	-153

	FY 2000 vs. FY 1999 ($000)
OH-MB-10/Exit Support Project	
■ Increase is due to the reduction of FY 1999 Budget Authority requirements of $2,700,000 because of uncosted carryover balances to fund work scope such as Environmental Protection Agency regulatory oversight and Defense Contract Audit Agency support and to an increase of approximately $3,700,000 which will be reallocated to other Project Baseline Summaries to support acceleration of critical path shutdown activities in the tritium contaminated facilities pending approved baseline change control proposals	6,397
Total Funding Change, Ohio	16,242

Rocky Flats

Mission Supporting Goals and Objectives

Program Mission

The mission of the Defense Environmental Management, Site Closure program, carried out by the Rocky Flats Field Office, is to manage the site waste and materials, and to clean up and convert the site to beneficial use in a manner that is safe, environmentally and socially responsible, physically secure, and cost-effective.

Program Goal

The goal for the Rocky Flats Environmental Technology Site is to accelerate the site closure from the current baseline of 2010 to 2006.

Program Objectives

The Rocky Flats Site has developed a critical path for the current baseline activities that support the closure of the site by 2010.

The site baseline provides the detailed cost, scope, schedule, and critical path to achieve site closure by FY 2010. The details of this baseline are embodied in the Rocky Flats *Accelerating Cleanup: Paths to Closure* plan, which contains 29 projects (24 active projects in FY 1999) that are described in the project baseline summaries. The FY 2010 baseline also identifies a number of opportunities to accelerate the closure of Rocky Flats by 2006.

The critical path of work activities to support the closure of Rocky Flats requires:

Stabilization of Special Nuclear Material and Residues

The early completion of stabilization and deactivation activities is necessary to begin building demolition as soon as possible and cleanup of the affected areas. The completion of these activities can make funds currently used for surveillance and maintenance available for progress towards site closure.

The FY 2010 baseline schedule assumes that plutonium metals and oxides will be stabilized, placed in DOE-STD-3013 containers and shipped to the Savannah River Site K-Area from FY 2002-FY 2004, consistent with the Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Material Programmatic Environmental Impact Statement.

Special nuclear material stabilization projects will focus on the safe storage, processing, packaging, and off-site shipment of all special nuclear material at Rocky Flats. This includes 2,300 containers of plutonium metals and oxides, 103,420 kilograms of plutonium residues, and approximately 24,000 liters of plutonium solutions.

Off-Site Shipment of Special Nuclear Material and Stabilized Residues

To enable cleanup by FY 2006, plutonium metals and oxides must be removed from the site by FY 2002, 2 years early. The accelerated movement of materials provides for significant mortgage reduction savings in security and nuclear safety costs, and allows the decommissioning of the nuclear facilities to begin 2 years earlier. The Department is performing significant facility modifications at the Savannah River Site consistent with the recently issued Record of Decision for storage of excess plutonium in order to accommodate this transfer. Pending issuance of the second Record of Decision from the Environmental Impact Statement for Rocky Flats residues, the 2010 baseline assumes that plutonium residues will be stabilized, certified, and shipped to the Waste Isolation Pilot Plant by FY 2004.

Environmental Management made the first of two decisions (November 1998) based on environmental analysis to dispose of a large portion of the residues as waste at the Waste Isolation Pilot Plant and to send a few materials off-site for stabilization. With the second decision expected in January 1999, the majority of the Rocky Flats residues will be packaged as waste in preparation for disposal at the Waste Isolation Pilot Plant, significantly minimizing the need for processing and expediting removal of residues from the site by two years. Since material stabilization and removal are on the critical path to closure, the completion of this work by FY 2002 will provide mortgage reduction savings as well as increase schedule confidence for site closure.

Deactivation of Plutonium Buildings once the Special Nuclear Material is Removed

The deactivation program will focus only on major plutonium and industrial facilities that would benefit from significant mortgage reduction or that require deactivation in preparation for decommissioning activities.

The current baseline assumes that major nuclear facilities decommissioning can take 5 to 7 years, and these activities dominate the later part of the site critical path schedule. The site is planning to complete the decommissioning of the Building 779 Cluster, a former plutonium production facility by June 2000, to not only improve the cost and schedule estimates for the decommissioning effort but to examine technologies to accelerate the overall closure schedule. To meet closure by FY 2006, the average estimated length of time it takes to decontaminate and decommission the major nuclear facilities must be improved by at least 1 year.

Demolition of buildings as soon as possible after completion of deactivation

In order for Rocky Flats to meet the accelerated closure goal, facilities will need to undergo decommissioning as soon as possible after the completion of deactivation. A facility disposition path is being developed for each of the building cluster closure projects. This approach integrates and coordinates the deactivation, decontamination, and demolition activities. The schedules for facility disposition are aggressive and decommissioning needs to immediately follow, or in some cases be conducted in parallel with, the deactivation phase. This is essential to avoid sustained high mortgage costs within the plutonium facilities and to proceed to construction of the closure caps.

Construction of Closure Caps

In order to accelerate closure, construction of the closure caps will need to be accomplished in phases. Rather than waiting until all facilities within the existing protected area are completely demolished and the entire acreage is remediated, as substantial areas are prepared, the closure caps can be constructed following remediation in the 300 and 700 areas. These closure caps will reduce water infiltration and direct runoff in the area, thereby preventing migration of any contaminants.

Safe Storage, Treatment and Disposal of Nuclear Waste

The waste management project will focus on safe, compliant, and cost-effective waste minimization, storage, treatment, and disposal of low-level, mixed low-level, transuranic, mixed transuranic, hazardous, and sanitary waste. The project's near-term goals involve continuing treatment of hazardous and sanitary waste, off-site shipment and disposal of low-level waste, off-site treatment and disposal of mixed low-level waste. Selection of a disposal location for mixed waste must take place prior to FY 2000. Development of treatment capacity for mixed waste, and characterization and certification of transuranic and mixed transuranic waste, and initiation of shipments for disposition at the Waste Isolation Pilot Plant in New Mexico in FY 1999 is critical to meeting the closure goals for FY 2006.

Cleanup and Stewardship of Contaminated Area

The Rocky Flats environmental restoration program activities will clean up a total of 144 cleanup sites (Individual Hazardous Substance Site, Potential Areas of Concern, Under Building Contamination, plumes, final covers) and decommission 686 facilities and buildings over the life of the site cleanup project. The designated release sites were originally grouped into 16 operable units, four of which have been closed through No Further Action Record of Decisions. Under the Rocky Flats Cleanup Agreement, signed July 19, 1996, most of the remaining operable units have been grouped into two areas, the Industrial Area and the Buffer Zone. Operable units 1, 3, 5, 11, 15, and 16 will have separate Records of Decision because they were either completed or nearly complete at the time the agreement was signed. Limited remediation is planned for the early years of site closure since many sites are unavailable for remediation. By the end of FY 1999, approximately 16 percent of the anticipated site remediations are planned to be completed.

Focus Management and Workers on Progress

Projectization is intended to focus management attention on accomplishing measurable progress towards site closure. Progress metrics have been established for critical projects. These metrics establish quantitative annual targets (as a percentage of the total life-cycle project requirements) from which contractual performance measures will be developed and tracked to assess progress toward site closure. The project approach reinforces the commitment to accelerate the cleanup of Rocky Flats by implementation of a measurable and cost-effective program.

Although the processes required to attain this goal are not yet clearly defined, accelerated progress in tearing buildings down through technology deployment, productivity, contract incentives, and project management over the last 2 years provide confidence that continued improvements in these and other areas can help achieve the goal. This budget request reflects the FY 2010 baseline.

Performance Measures

Performance measures are provided at an aggregate level after the Funding by Site table as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Completed 38 special nuclear material shipments to Oak Ridge and Pantex (FY 1998).
- Stabilized or repackaged 5,004 kilograms (FY 1998) and 32,662 kilograms (FY 1999) of plutonium-bearing residues.
- Drained two liquid systems and strip out two liquid systems (FY 1998) and drain and remove 12 liquid systems (FY 1999) from Building 771.
- Drained two areas (FY 1998) and 10 areas (FY 1999) in Building 371.
- Disposed of 9,196 m^3 of low-level/mixed low-level waste to the Nevada Test Site and Envirocare in Utah (FY 1998). Dispose of 2,630 m^3 of low-level waste and 2,886 m^3 of mixed low-level waste off-site (FY 1999).
- Completed construction of Building 440 transuranic repack station outside of protected area (FY 1998).
- Removed 80 gloveboxes from Building 779 (FY 1998).
- Demolished Building 123 and outbuildings (FY 1998).
- Dispositioned 36,000 (FY 1998) and 60,000 (FY 1999) excess property items.
- Completed source removal at T-1 trench (FY 1998).
- Completed mound plume long-term treatment installation (FY 1998).
- Install Plutonium Stabilization and Packaging System in Building 371 (FY 1999).
- Prepare 670 m^3 of transuranic waste to be disposal ready for shipment to the Waste Isolation Pilot Plant (FY 1999).
- Remove 22 kilograms of plutonium and uranium holdup (radioactive contamination) (FY 1999).
- Disposition 4,000 waste chemical containers (FY 1999).
- Demolish nine facilities comprising 8,462 square feet (FY 1999).
- Remediate two environmental sites (FY 1999).
- Disposition 500 items of classified matter (FY 1999).
- Operate Plutonium Stabilization and Packaging System to stabilize/repackage at least 900 containers of plutonium metals and oxides (FY 2000).

- Complete off-site disposal of approximately 13,000 m^3 of mixed low-level, low-level and hazardous wastes and 12,000 m^3 of uncontaminated sanitary wastes, and make ready for offsite disposal approximately 2,000 m^3 of transuranic/mixed transuranic waste (FY 2000).
- Plutonium Solid Residue Stabilization Project will begin salt distillation for environmental restoration and molten salt extraction salts; will continue stabilization of ash and wet combustible residues; and repackaged fluorides will be shipped to the Savannah River Site (FY 2000).
- Procure 2,100 shipping containers to support shipment of metals and oxides (FY 2000).
- Metal and oxides, and scrub alloy shipments will be made to Savannah River pending final Record of Decision (FY 2000).
- Tap, drain, and remove approximately 9 liquid process systems; and dismantle, size reduce, and package gloveboxes, tanks, and other equipment for shipment (FY 2000).
- Building 881, 865, and 883 clusters will complete safe shutdown of approximately 22 rooms; and Building 779 closure will be complete (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQNP-SI01-CL / Security Investigations	0	948	1,278	330	34.8%
RF-001 / Buffer Zone Closure Project	13,606	13,646	10,185	-3,461	-25.4%
RF-002 / Waste Management Project	56,508	68,122	79,775	11,653	17.1%
RF-003 / Remediation Waste & Contingent Storage Project	-9	1	0	-1	-100.0%
RF-004 / Special Nuclear Material Capital Support Project	9,463	2,477	3,930	1,453	58.7%
RF-006 / Special Nuclear Material Consolidation Project	3,008	2,234	1,287	-947	-42.4%
RF-007 / New Pu Interim Storage Vault	17	0	0	0	>999.9%
RF-008 / Plutonium Metals and Oxides Stabilization	7,206	15,603	14,593	-1,010	-6.5%
RF-009 / Plutonium Solid Residue Stabilization Project	56,263	49,888	64,882	14,994	30.1%
RF-010 / Plutonium Liquid Stabilization	12,473	8,672	0	-8,672	-100.0%
RF-011 / Uranium Disposition Project	587	1,048	0	-1,048	-100.0%
RF-012 / Special Nuclear Material Shipping Project	3,475	7,166	17,166	10,000	139.5%
RF-013 / Closure Caps Project	0	30	0	-30	-100.0%
RF-014 / Industrial Zone Closure Project	22,269	23,127	19,799	-3,328	-14.4%
RF-015 / Miscellaneous Production Zone Cluster Closure Project	8,828	11,488	14,969	3,481	30.3%
RF-016 / Building 371 Cluster Closure Project	15,930	19,384	20,014	630	3.3%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
RF-017 / Building 707/750 Cluster Closure Project	16,942	19,880	18,669	-1,211	-6.1%
RF-018 / Building 771/774 Cluster Closure Project	19,097	20,524	20,764	240	1.2%
RF-019 / Building 776/777 Cluster Closure Project	12,728	16,058	15,486	-572	-3.6%
RF-020 / Building 881 Cluster Closure Project	5,064	5,083	4,542	-541	-10.6%
RF-021 / Building 991 Cluster Closure Project	1,048	1,471	1,146	-325	-22.1%
RF-022 / Building 779 Cluster Closure Project	19,561	20,495	7,200	-13,295	-64.9%
RF-023 / Utilities and Infrastructure Project	41,906	40,574	41,905	1,331	3.3%
RF-024 / Safeguards and Security Project	36,792	45,002	43,531	-1,471	-3.3%
RF-025 / Infrastructure Improvement / Replacement Project	19,907	17,782	8,026	-9,756	-54.9%
RF-027 / Analytical Services Project	9,957	7,122	7,807	685	9.6%
RF-029 / Rocky Flats Office - DOE Management	20,797	17,855	18,800	945	5.3%
RF-030 / Kaiser-Hill Project Management	122,949	127,068	120,731	-6,337	-5.0%
RF-034 / Management Project	95,728	94,452	100,725	6,273	6.6%
Total, Rocky Flats	632,100	657,200	657,210	10	>999.9%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Rocky Flats Plant	611,303	638,397	637,132	-1,265	-0.2%
Rocky Flats Field Office	20,797	18,803	20,078	1,275	6.8%
Total, Rocky Flats	632,100	657,200	657,210	10	>999.9%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	18.0	13.0	15.0
Cleanups	2.0	2.0	2.0
Facility Deactivation			
Completed Deactivations (NB)	2.0	8.0	0.0
Facility Decommissioning			
Assessments	34.0	92.0	2.0
Cleanups	12.0	9.0	33.0
Nuclear Material Stabilization			
Stabilized - Plutonium Solution (L)	3,035.0	0.0	0.0
Stabilized - Plutonium Residue (Kg Bulk)	5,004.0	32,662.0	36,480.0
Made Disposition Ready - Pu Metal/Oxides/Other	0.0	0.0	910.0
Transuranic Waste (TRU)			
Treatment (m^3)	0.0	0.0	0.0
Storage (m^3)	1,849.0	4,209.0	4,214.0
Ship to DOE Disposal Site (m^3)	35.0	670.0	2,000.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	4,126.0	4,886.0	6,575.0
Storage - Total (m^3)	8,114.0	7,999.0	3,873.0
Disposal - DOE Onsite/Commercial (m^3)	6,527.0	2,886.0	6,575.0
Low Level Waste (LLW)			
Storage - Total (m^3)	9,576.0	8,614.0	11,178.0
Disposal - Ship to DOE Disposal Site (m^3)	2,669.0	2,630.0	2,050.0

Site Description

The Rocky Flats Environmental Technology Site is located near Denver, Colorado, on about 11 square miles at the base of the Rocky Mountains. The Rocky Flats Plant was selected by the Atomic Energy Commission in 1951 as one of seven production plants in the United States Weapons Complex. The Rocky Flats Plant played an integral part in the Nation's nuclear defense. Its mission was to manufacture nuclear weapons components from materials such as plutonium, beryllium, and uranium. When operations ceased, large amounts of plutonium, plutonium compounds, and metallic residues remained in the production lines, tanks, and process furnaces at various facilities at the site. Significant volumes of hazardous and radioactive waste generated during production operations were also present throughout numerous buildings.

In 1991, the Rocky Flats Plant transitioned to a new mission; cleaning up contamination and waste from its past activities and transitioning its facilities to cleanup in a manner that is safe, environmentally and socially responsible, physically secure, and cost-effective. It was at this time that the Rocky Flats Plant became the Rocky Flats Environmental Technology Site. Adequate funding for the life of the Site Cleanup mission is a critical element as is the DOE's ability to overcome complex-wide barriers and to facilitate resolution of national issues of complex-wide integration for off-site shipment of special nuclear materials and radioactive waste for storage, treatment, and disposal. Availability of receiver sites is also essential to achieving closure by FY 2006. This includes the availability of the Waste Isolation Pilot Plant for transuranic and residue wastes, a DOE site for acceptance of plutonium metals and oxides, as well as some residues, and DOE and/or commercial facilities for disposal of low-level and mixed low-level waste.

The Rocky Flats Environmental Technology Site's cleanup and closure activities are currently organized into 29 Project Baseline Summaries each including a detailed life cycle work scope, schedule, and cost estimate built from over 20,000 individual work elements which are integrated into a single Critical Path schedule.

The Site is managed by a performance-based integrating management contractor whose contract was established consistent with the 1993 Government Performance Results Act which requires the establishment of program goals and development of measures to monitor contractor progress toward the achievement of those goals. The integrating management contractor plans and integrates work activities, manages subcontractors in performing work, provides support functions including quality assurance and site safety program direction. The Rocky Flats Field Office manages the integrating management contract, including setting and verifying performance goals, makes program decisions, and provides local oversight, public and regulatory interface on site work activities. A DOE Headquarters closure team provides intersite coordination on material shipment and disposition decisions and activities relating to site closure. Award and incentive fees have been established by the DOE to motivate the contractor to perform.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Rocky Flats Environmental Technology Site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure* plan. The funds requested for FY 2000 are appropriate to perform the activities based on historical level of effort costs. An independent assessment of projects is currently in process.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
HQNP-SI01-CL/Security Investigations			
Funding will be used to perform new security investigations and re-investigations for non-Federal employees in accordance with DOE Order requirements for the Rocky Flats site.			
HQNP-S101-CL	0	948	1,278

Metrics
No quantifiable corporate performance measures are associated with this project.

RF-001/Buffer Zone Closure Project

Remedial action activities are included within the Buffer Zone Closure Project which consists of 67 Individual Hazardous Substance Site. This project includes: operation of groundwater and surface water monitoring stations; design, construction, and operation of groundwater containment and treatment systems; remediation of Individual Hazardous Substance Sites/Potential Area Contamination; continuing landlord functions for the Building 130 cluster and operation of the firing range.

- On-site transfer and off-site discharge of approximately 200 million gallons of Building 995 Wastewater Treatment Plant effluent and Rocky Flats Environmental Technology Site storm water.
- Complete quarterly and annual reporting of groundwater sampling results.
- Complete quarterly and annual reporting of surface water sampling results.
- Conduct remediation planning for the 903 Pad to include:
  - limited sampling
  - decision document preparation
  - public/regulator involvement
  - potential treatability study
- Operate groundwater management systems.

RF-001	13,606	13,646	10,185

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Action/Release Site			
Assessments	11.0	12.0	12.0
Cleanups	2.0	2.0	1.0

RF-002/Waste Management Project

The Waste Management Project includes all activities that support the treatment, storage, and disposal of all wastes currently in the inventory and projected to be generated from other sites closure projects. Specific waste types include: low-level waste, mixed low-level waste, transuranic waste, transuranic mixed waste, hazardous waste, and other sanitary/uncontaminated waste. The scope of the project includes safe and compliant management on-site, in new and existing storage facilities; safe and compliant treatment, including construction of liquid waste treatment upgrade, of mixed wastes at on-site and off-site locations; and safe and compliant disposal at approved off-site repositories.

- In FY 2000, additional mixed low-level waste will be disposed as the saltcrete/pondcrete disposal project enters completion. Also, the disposal ready quantities of transuranic and transuranic mixed waste will increase as the Site's ability to characterize transuranic waste is also increased. Specific planned accomplishments include: (If disposal facility is not available - additional storage capacity will need to be constructed, in lieu of or in addition to disposal).
  - Make 2,000 m^3 of transuranic/mixed transuranic waste disposal ready for off-site disposal.
  - Complete off-site disposal of 6,575 m^3 of mixed low-level waste.
  - Complete off-site disposal of 2,050 m^3 of low-level waste.
  - Complete off-site disposal of 186 m^3 of hazardous waste.
  - Complete off-site commercial disposal of 16,400 m^3 of uncontaminated/sanitary waste.
  - Maintain existing landfill in "stand-by" as a disposal contingency.
  - Continue operation and maintenance of the Sewage Treatment Plant.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ Continue operation and maintenance for transuranic, transuranic mixed, low-level, mixed low-level and other regulated waste storage areas.			
▸ Initiate operation of the shipping/staging module and the characterization module for transuranic/transuranic mixed waste.			
▸ Continue operation and maintenance for process wastewater treatment in Building 374.			
▸ Continue characterization and repackaging activities to prepare disposal ready volumes of transuranic/transuranic mixed waste for future shipment to the Waste Isolation Pilot Plant.			
▸ Continue completion of Site Treatment Plan and Compliance Order commitments, Rocky Flats Cleanup Agreement commitments, Chemical Management Consent Order.			
RF-002	56,508	68,122	79,775

Metrics			
Remedial Action/Release Site			
Assessments	1.0	0.0	0.0
Transuranic Waste (TRU)			
Storage (m^3)	1,849.0	4,209.0	4,214.0
Ship to DOE Disposal Site	35.0	670.0	2,000.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	4,126.0	4,886.0	6,575.0
Storage (m^3)	8,114.0	7,999.0	3,873.0
Disposal - DOE Onsite/Commercial (m^3)	6,527.0	2,886.0	6,575.0
Low Level Waste (LLW)			
Storage - Total (m^3)	9,576.0	8,614.0	11,178.0
Disposal - Ship to DOE Disposal Site (m^3)	2,669.0	2,630.0	2,050.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
RF-003/Remediation Waste and Contingent Storage Project			
The purpose of this project is to provide the resources necessary for the development of a new low-level and mixed low-level waste containerized storage facility for storage of remediation wastes. The facility will provide capacity and capability to store, stage, and ship large volumes of remediation waste anticipated to be generated from the decontamination, decommissioning, and demolition of site facilities, as well as from restoration activities associated with contaminated areas at the Site.			
■ Project curtailed.			
RF-003	-9	1	0
Metrics No quantifiable corporate performance measures are associated with this project.			
RF-004/Special Nuclear Material Capital Support Project			
The Special Nuclear Material Capital Support project contains two subprojects. The Building 371 upgrade subproject responds to Defense Nuclear Facilities Safety Board Recommendation 94-3 for facility upgrades to withstand defined seismic events. The special nuclear material support subproject provides capital and General Plant Project upgrades to facilities or projects within the nuclear production.			
■ Construction of the cooling tower will be completed, tested, and turned over for operations.			
RF-004	9,463	2,477	3,930
Metrics No quantifiable corporate performance measures are associated with this project.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RF-006/Special Nuclear Material Consolidation Project			
The Special Nuclear Material Consolidation project manages the intra-site transport of plutonium metals, oxides, and residues between facilities as necessary for mortgage reduction and interim storage and staging of these materials for processing or off-site shipment. This project includes consolidation of special nuclear material from other facilities into Building 371, and tracking and closure of plutonium and enriched uranium Environmental Safety and Health vulnerabilities.			
■ Transfer of special nuclear material residues, not scheduled for processing, and holdup from gloveboxes and ventilation ducts from Buildings 776/777 are scheduled to be completed.			
RF-006	3,008	2,234	1,287
Metrics No quantifiable corporate performance measures are associated with this project.			
RF-007/New Pu Interim Storage Vault			
Construction of a new Interim Plutonium Storage Facility was curtailed. Conceptual design was completed in FY 1997. Miscellaneous activities were supported in FY 1998.			
■ No activity.			
RF-007	17	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
RF-008/Plutonium Metals and Oxides Stabilization			
The Plutonium and Oxides Stabilization project supports the packaging of all material greater than 50 weight percent plutonium per the requirements of DOE-STD-3013, for interim storage at the Rocky Flats Environmental Technology Site for eventual off-site disposition. Repackaging addresses Defense Nuclear Facilities Safety Board Recommendation 94-3 by placing dispersable plutonium oxides in more robust containment. Installation, testing and safety documentation for the Plutonium Packaging System substantially will be completed in FY 1999.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Operate Stabilization Packaging System, and stabilize/repackage at least 910 containers.			
■ Continue size reduction operation for large metal items, completing at least half of the items.			
RF-008	7,206	15,603	14,593

Metrics			
Nuclear Material Stabilization			
Made Disposition Ready - Pu Metal/Oxides/Other	0.0	0.0	910.0

RF-009/Plutonium Solid Residue Stabilization Project

Both DOE's Plutonium Vulnerability Study and the Defense Nuclear Facilities Safety Board Recommendation 94-1 identified the unstabilized residues at the Rocky Flats Environmental Technology Site as a potential hazard. The project is to conduct the minimum processing necessary to prepare solid residues to address Defense Nuclear Facilities Safety Board Recommendation 94-1. The residues will be processed to meet the Interim Safe Storage Criteria and the Waste Isolation Pilot Plant Waste Acceptance Criteria in accordance with the Site Integrated Stabilization Management Plan Version 7.0. Additionally, the Settlement Agreement and Compliance Order on Consent No. 93-04-23-01 with the State of Colorado requires the processing of the backlog of mixed residues to put them in a shippable and/or disposable form as expeditiously as reasonably possible and to remove them from plant site as expeditiously as reasonably possible once an off-site disposal facility becomes available.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Processing of solid residues includes characterization, stabilization, safeguards termination limit compliance, repack, and certification for disposal. The material to be processed includes all the backlog solid residues generated as byproducts from plutonium production operations. Solid residues are categorized by type of material identified by an Item Description Code. The inventory of solid residues consists of approximately 106 metric tons of bulk material in 99 item description codes with an average plutonium concentration of about 3 percent. The residues are stored in approximately 4,000 drums and 4,000 containers. Four separate processes are required for this material. Wet residues and combustibles will be processed in one line in Building 371. Salt, ash, and dry residues will be processed in three lines in Building 707. Processing commenced in November 1997 and will be complete in 2002. Shipping of the residues off-site will be complete in FY 2004. The project consists of two subprojects: the Special Nuclear Material Solid Residue Development project; and, the Special Nuclear Material Solid Residue Processing project.			
■ Process 8,000 kilograms of salt residues in FY 2000.			
■ Repack 7,950 kilograms of ash residues in FY 2000.			
■ Ship all 317 kilograms of plutonium fluorides to the Savannah River Site.			
■ Continue stabilization of ash and wet combustible residues.			
RF-009	56,263	49,888	64,882

Metrics			
Nuclear Material Stabilization			
Stabilized - Plutonium Residue (kg Bulk)	5,004.0	32,662.0	36,480.0

RF-010/Plutonium Liquid Stabilization

The Plutonium Liquid Stabilization project is planned to be completed by the end of FY 1999. Liquid stabilization involves the removal of 23,925 liters of plutonium liquid from tanks, piping, and other containers stored in Buildings 371, 559, 771, 776, 777, and 779; processing of the liquids to convert them to various forms for safe interim storage; mitigation of hydrogen in tanks; and mixed residue Resource Conservation and Recovery Act tank closure.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ No activity, project complete.			
RF-010	12,473	8,672	0

Metrics			
Nuclear Material Stabilization			
Stabilized - Plutonium Solution (L)	3,035.0	0.0	0.0

RF-011/Uranium Disposition Project

The Uranium Disposition project supports activities to remove plutonium contamination from stored enriched uranium hemishells to permit off-site shipment and acceptance by Oak Ridge Y-12; remove residual highly enriched uranyl nitrate by removing the Raschig rings in the tanks from Rocky Flats; and to continue highly enriched uranyl nitrate conversion to highly enriched uranium oxide off-site. This project is planned for completion in FY 1999.

■ No activity.

RF-011	587	1,048	0

Metrics
No quantifiable corporate performance measures are associated with this project.

RF-012/Special Nuclear Material Shipping Project

The Special Nuclear Material Shipping project includes pits, enriched uranium, composite parts, plutonium metal and oxides, scrub alloy and other material. This project element supports all activities necessary to ensure the availability of off-site shipping containers, procedure development, and packaging and shipping of spent nuclear material. The 2010 baseline supports shipments of plutonium metal and oxides to Savannah River Site beginning in 2002. In order to support a 2006 closure, shipments will begin in January 2000 to the K-Area Nuclear Material Storage project located at the Savannah River Site. The FY 2000 scope reflects a transfer in funding responsibility for Type B (9975) shipping containers from the Savannah River Site to this Rocky Flats project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Fund procurement of 2,100 Type B (9975) shipping containers to support shipment of plutonium metal and oxides to Savannah River Site K-Area.			
■ Ship 700 containers of plutonium metal and oxides to the Savannah River Site K-Area.			
■ Complete four shipments of scrub alloy to Savannah River Site.			
RF-012	3,475	7,166	17,166

Metrics
No quantifiable corporate performance measures are associated with this project.

RF-013 Closure Caps Project

The scope of the Closure Cap project includes design and construction of the caps once the facilities have been demolished in the 300 area and 700 area. This project also includes regrading and revegetating the industrial area and removal of pavement and foundations, if necessary. Construction of the caps will begin in FY 2006 and will cover the 300 area, 700 area, solar ponds, and possibly the landfill. Periodically, technology updates will be evaluated and cost estimates will be updated.

■ No activity.			
RF-013	0	30	0

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

RF-014/Industrial Zone Closure Project

The purpose of the Industrial Zone Closure project is to continue operations of the facilities within the industrial zone until such time as operations can be discontinued and the facilities dismantled. The industrial zone consists of the majority of the facilities located south of the protected area and within the perimeter fence.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The facilities in the industrial zone consist of buildings with tenants that comprise the infrastructure for the site which includes services (Fire Department, Garage, Metrology, Security, etc.) utilities (Water Plant, Steam Plant, electrical distribution, etc.) and administrative services (finance, procurement, payroll, etc.). These services are required to support the risk reduction, deactivation, decommissioning and closure activities planned over the remaining life of the plant. The industrial zone also contains one production facility, Building 444, a uranium/beryllium fabrication/machining facility that was shut down in 1989 without any deactivation or decontamination activities, including equipment removal. Building 460 was also a former production facility, providing stainless steel machining for weapons parts, but that facility has been converted to an administrative building housing DOE personnel.			
■ Landlord functions and support activities will continue.			
■ Complete remediation of Bowman's Pond release site.			
■ Complete decommissioning of one facility.			
■ Submit annual Tier II Chemical Inventory Report.			
RF-014	22,269	23,127	19,799

Metrics			
Facility Decommissioning			
Assessments	0.0	22.0	1.0
Cleanups	8.0	0.0	1.0
Remedial Action/Release Site			
Assessments	5.0	1.0	3.0
Cleanups	0.0	0.0	1.0

RF-015/Miscellaneous Production Zone Cluster Closure Project

The scope of the Cluster Closure project is summarized below for the six major activities.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- Facility Landlord Functions: Conduct Limiting Conditions for Operations surveillance's on Vital Safety Systems as required by the building specific authorization basis document (i.e. fire systems, criticality alarm systems, heating, ventilation, and air conditioning systems). Conduct routine compliance surveillance/inspections on Resource Conservation and Recovery Act units, security systems, radiological control requirements, industrial safety, etc. Conduct baseline maintenance activities on Vital Safety Systems, facility support systems/structures, environmental compliance and waste management support systems, security systems, etc. Provide operations management and technical support for building baseline activities and in support of risk reduction activities.
- Deactivation: The scope of the deactivation phase includes all of the physical activities to prepare and turn over a building cluster to decommissioning as agreed upon in the building specific End State Criteria.
- Decommissioning: The scope of the decommissioning phase includes all of the physical activities to decontaminate, dismantle, and demolish building clusters in preparation for individual hazardous substance site remediation and final closure.
- Closure: The scope of this activity includes the final close-out of the cluster site upon completion of decommissioning and individual hazardous substance site remediation, and includes the regulatory and project close-out documentation required by the Department of Energy and the Rocky Flats Cleanup Agreement.
- Remediate/Contain High Risk Individual Hazardous Substance Sites: The scope of this activity includes remediation or containment as appropriate to close the High Risk individual hazardous substance sites in the Miscellaneous Production Zone. Typically, remediation will include excavation and treatment such as thermal desorption and/or containment could include capping or closure in place.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ There are 30 individual hazardous substance sites in the Miscellaneous Production Zone that are No Further Action Sites and will undergo No Further Action Justification to delete these individual hazardous substance sites from the Rocky Flats Cleanup Agreement under this project. The High Risk individual hazardous substance sites include: Rad Site Building 559 (Individual Hazardous Substance Site 159); Under Building Contamination (2 buildings); Solar Ponds (Individual Hazardous Substance Site 101).			
■ The landlord functions and support activities will continue in the operating buildings.			
■ Complete decommissioning of nine facilities.			
RF-015	8,828	11,488	14,969

Metrics			
Facility Decommissioning			
Assessments	8.0	14.0	1.0
Cleanups	0.0	8.0	9.0
Remedial Action/Release Site			
Assessment	1.0	0.0	0.0
Facility Deactivation			
Completed Deactivations	0.0	8.0	0.0

RF-016/Building 371 Cluster Closure Project

Prior to the end of the Cold War, the purpose of the Building 371 facility was threefold: (1) to recover plutonium from all residues generated by plutonium-related fabrication, assembly, and research activities throughout Rocky Flats Plant, (2) to convert the recovered plutonium into high purity metal buttons, and (3) to recover associated americium and convert it to americium dioxide, which is a sellable product. Included in the 371 Cluster Closure project are Buildings 371, 373, 374, 374A, 377, 378, 381, T371H, T371J, T371K, 376, T376A, T371I, 371A and tanks 163, 164, 165, 166, 167, 168, 169, 170, 171, 224, 225, 226, 227, and 228. Resumption efforts have been undertaken in several buildings to begin processing, stabilizing, and repackaging the special nuclear material to make it safe to store, handle, and ship.

- Initiate residue stabilization and repack of high-efficiency particulate air filters and dry combustibles.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue consolidation and shipment of special nuclear material.			
■ Continue support of the International Atomic Energy Agency agreement by storing, assaying, and inspecting that material.			
RF-016	15,930	19,384	20,014

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

RF-017/Building 707/750 Cluster Closure Project

During the Cold War period, Building 707 was used to perform all metallurgical and assembly processes for manufacturing plutonium components. Different modules located in Building 707 housed operations such as casting, rolling, forming, machining, assembly and testing of materials. In addition, plutonium items were stored in vaults such as the X-Y Retriever. Resumption efforts have been undertaken in Building 707 to begin processing, stabilizing, and repackaging the special nuclear material to make it safe to store, handle, and ship. This effort will continue in Building 707 through approximately FY 2002.

- Maintain landlord functions and begin special nuclear material removal operations.

RF-017	16,942	19,880	18,669

Metrics			
Facility Decommissioning			
Assessments	0.0	1.0	0.0
Cleanups	2.0	0.0	0.0

RF-018/Building 771/774 Cluster Closure Project

Specifically, this project is to accomplish a transition of Building 771/774 and 771A Clusters from an operating nuclear facility and support facilities to a closed and remedied site. The most efficient way to execute this strategy to plan an effort as a "closure project," and not a "deactivation project" followed by a "decommissioning project." In FY 1998, Building 771/774 Cluster was transferred to the decommissioning subcontractor, and deactivation and decommissioning activities have begun.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Drain five and remove two process piping systems by June 2000.			
■ Six decommissioning worksets will be completed. This entails dismantlement, size reduction and packaging for shipment of gloveboxes, tanks, and other equipment.			
■ Close the Material Access Area by December 1999.			
RF-018	19,097	20,524	20,764
Metrics			
Facility Decommissioning			
Assessments	0.0	35.0	0.0

RF-019/Building 776/777 Cluster Closure Project

As an effort to stabilize material progresses, and as buildings are no longer required to process and store special nuclear material, it is necessary to deactivate and decommission these nuclear and support facilities to further minimize risk, reduce mortgage costs, and to fulfill the site closure mission.

Buildings 776/777 performed manufacturing and assembly of special order and war reserve weapons, disassembly, processing and recovery from site returns, waste operations including size reduction and incineration, and several developmental programs including nondestructive testing, joining, and coatings. This process produced significant amounts of plutonium contaminated lubricants, shavings, and secondary residues that were temporarily stored and periodically recycled back into the plutonium manufacturing process. Included in the 776/777 Cluster are Buildings 776, 777, 701, 702, 703, 712, 713, 781 and tanks 199, 200, 201, 202, 203, 207, 244, and 245. When all nuclear production was halted in 1989, special nuclear materials were left in place without any handling or repackaging pending resumption of nuclear operations.

- Continue landlord functions for the 776/777 Cluster.
- Remove holdup from five areas to below safeguard termination limits.
- Begin deactivation, planning, and regulatory documentation development.

RF-019	12,728	16,058	15,486

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Decommissioning			
Assessments	0.0	20.0	0.0

RF-020/Building 881 Cluster Closure Project

The Building 881 Cluster Closure project includes 881, 865, 883, 881 Trailers, 881/883 Stacks, 881/883 Tunnel, and Tanks. The strategy for the 881, 865/883 Cluster prior to beginning active decontamination and decommissioning in FY 2006 is to systematically shut down rooms, areas and entire facilities while carrying out minimum surveillance and maintenance activities required to ensure regulatory compliance and safe operations of the facilities. Safe shutdown is being undertaken so that the required surveillance, monitoring and maintenance of the buildings can be reduced, thus freeing-up funding for other decontamination and decommissioning and closure activities. It is anticipated that the shutdown activities which are performed prior to decontamination and decommissioning will be accomplished in three overlapping phases and will result in the minimum funding level that is required to maintain the buildings prior to the start of decontamination and decommissioning.

- Complete the safe shutdown (closure/padlocking) of 22 rooms in the Building 881/865/883 Clusters.
- Commence Building 881 deactivation activities.

RF-020	5,064	5,083	4,542

Metrics			
Facility Deactivation			
Completed Deactivations	2.0	0.0	0.0
Facility Decommissioning			
Assessments	2.0	0.0	0.0
Cleanups	2.0	0.0	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RF-021/Building 991 Cluster Closure Project			
The primary function of Building 991 Cluster is storage of transuranic waste in the protected area. Building 991 Cluster is targeted to be the only location in the protected area for containerized transuranic and transuranic mixed waste, including waste generated from residue processing and decontamination and decommissioning of other facilities.			
■ Only landlord functions are planned in the Building 991 Cluster for FY 2000. Other closure actions are not scheduled until FY 2003.			
RF-021	1,048	1,471	1,146
Metrics			
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			

RF-022/Building 779 Cluster Closure Project

The Building 779 Cluster Closure project is to close and demolish all the facilities in the cluster, and to Remediate contaminants in the underlying soils in accordance with cleanup standards for the site.

The Building 779 Cluster consists of the primary building (Building 779), two filter plenum buildings, nine storage tanks, two tunnels and ten support buildings. Building 779 is a two-story, concrete structure with approximately 68,000 square feet of floor area. The building was primarily utilized for conducting research and development involving nuclear weapons materials processes, and approximately 60 percent of the space is contaminated or potentially contaminated. The building laboratories and shops are filled with mechanical and chemical process equipment, including approximately 100 gloveboxes. The primary contaminant is plutonium, but the building also contains small quantities of depleted uranium, beryllium and more than 4,000 chemicals, some of which are radiologically contaminated. The building exhaust system and two plenum buildings have plutonium contaminated ducts and high-efficiency particulate air filters. Completion of decommissioning in FY 2000 will mark the demolition of the first major DOE plutonium facility.

■ Complete demolition of 23 facilities in the Building 779 cluster.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Cluster closure will be performed.			
RF-022	19,561	20,495	7,200

Metrics			
Facility Decommissioning			
Assessments	24.0	0.0	0.0
Cleanups	0.0	1.0	23.0

RF-023/Utilities and Infrastructure Project

The Utilities and Infrastructure project provides the resources necessary to maintain the physical plant infrastructure. This includes activities which produce and distribute utilities (electricity, water, steam, natural gas, and inert gases) for use throughout the site. Other services include cafeteria food services, metrology laboratories, emergency preparedness, logistics services, fire protection and prevention, laundry operations, and filter services. Support services provide for the direct support of closure operations through property removal and disposal, transportation support, fire alarms systems maintenance, and fire systems inspection and maintenance.

- Annual Site Exercise - 30 Jun 2006.
- Draft Emergency Readiness Assurance Program Revision Document - 30 Sep 2000.
- Complete Annual Asset Disposition Pilot Program Report - 30 Oct 1999.
- Sensitive Property Inventory Document - 30 Sep 2000.
- Annual Update of Site Safeguards and Security Plan Document - 7 Jun 2000.

RF-023	41,906	40,574	41,905

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

RF-024/Safeguards and Security Project

The Safeguards and Security project provides for the physical protection, control, and accountability of special nuclear material and classified matter at Rocky Flats. This project supports site-wide safeguards and security program management, and the planning resources necessary to develop and implement the site Safeguards and Security Plan and associated security/emergency response plans. Protective program operational activities including armed protective force, special response team, physical security system alarm response and maintenance, access control, and property protection personnel and capabilities are also supported by this project. In addition, it includes special nuclear material control and accountability activities which assure secure and accurate measurement, reporting, and intra-site transportation of material drive these funding requirements. Internal security responsibilities, personnel security assurance programs, classified information management and control, and computer/communications/and technical security are addressed by this project.

- Master Safeguards and Security Agreement Project.
  - Construction Complete, Explosive Detection System - 14 Jul 2000.
  - Construction Complete, Grenade Screens - 17 Jul 2000.
- Safeguards and Security Operations Project.
  - Submit Validatable Site Safeguards and Security Plan Annual Update - 1 Mar 2000.
  - Annual Force on Force - 7 Jun 2000.
  - Annual Critical System Element Effectiveness Test - 31 Jul 2000.
  - Annual Update of Site Emergency Response Plan - 30 Sep 2000.
  - Identify, Verify, and Conduct Initial and Annual Reviews of all Personal Security Assurance Program Positions - 30 Sep 2000.
  - Annual Update of Materials Control and Accountability Plan - 31 Mar 2000.
  - Update Integrated Measurement Plan (For Accountability Measurements) - 1 Apr 2000.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Complete characterization of Holdup Measurements of Candidate Decontamination and Decommissioning Buildings - 30 Sep 2000.			
RF-024	36,792	45,002	43,531

Metrics
No quantifiable corporate performance measures are associated with this project.

RF-025/Infrastructure Improvement/Replacement Project

The Infrastructure Improvement/Replacement project includes a number of subprojects whose purpose is to maintain the infrastructure at the site and provide for safe and secure operations during site closure. These subprojects were some of the traditional line-item construction projects and include: Infrastructure Capital Equipment subproject that provides upgrades for improved operational efficiencies to support downsizing of facilities; Underground Storage Tank subproject that replaces 22 underground fuel storage tanks to comply with 40 CFR 280 and Colorado Compliance Regulation 7 CCR 1101-14; Health Physics/Representative Effluent Samplers subproject to replace effluent record samplers; Air Monitoring Improvement subproject to replace Selective Alpha Air Monitors; Plant Fire/Security System Replacement subproject to replace the primary fire and security alarm systems in certain facilities; and the Criticality Alarms and Plant Annunciation System Upgrade subproject to replace the obsolete and non-compliant Life Safety/Disaster Warning system in plutonium buildings.

- Capital Equipment Construction - Complete 30 Sep 2000.
- Construction Projects - Complete 30 Sep 2000.
- Plant Fire / Security System Replacement Subproject Fire System Installation - Complete 2 Aug 2000.

RF-025	19,907	17,782	8,026

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
RF-027/Analytical Services Project			
The Analytical Services project provides sampling and analytical chemistry services in support of site operations and closure activities. Analytical services satisfy the requirements of Federal, State, and local agencies for characterization of environmental contamination, facility waste, environmental monitoring, industrial hygiene, radiological health, medical monitoring, nuclear material processing and stabilization, and nuclear material control and accountability.			
■ The Analytical Services project will continue to support the following Rocky Flats Environmental Technology Site projects: 1) Buffer Zone Closure Project (RF-001); 2) Waste Management Project (RF-002); 3) Closure Cap Project (RF-013); 4) Industrial Zone Closure Project (RF-014); 5) Miscellaneous Production Zone Cluster Closure Project (RF-015); 6) Building 371 Cluster Closure Project (RF-016); 7) Building 707/750 Cluster Closure Project (RF-017); 8) Building 881 Cluster Closure Project (RF-023); 10) Safeguards and Security Project (RF-024); 11) Kaiser-Hill Project Management project (RF-030).			
RF-027	9,957	7,122	7,807

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
RF-029/Rocky Flats Office / DOE Management			
The Rocky Flats Field Office Program Support project provides for the Rocky Flats Field Office management of the Integrating Management Contract for the conduct of all site activities, including developing and monitoring of integrating management contractor performance measures, program execution guidance, Operational Readiness Reviews, facility representatives, the life-cycle baseline, budget management, prioritization, updates to the *Accelerating Cleanup: Paths to Closure* plan, and conduct of the Emergency Management Program. It also provides activities which support the Rocky Flats Cleanup Agreement, other Congressionally mandated programs (i.e., Technology Development, Health Studies, Worker Community Transition, etc.) legal expenses relating to the continuing class actions and other civil litigation activities of former site management and operations contractors under the "litigation and claims" clause of those contracts, and financial assistance to the State of Colorado.			
■ FY 2000 accomplishments are driven by the level of effort necessary to accomplish Congressionally mandated programs and to compliment planned site closure goals and accomplishments. Work will include continuation of activities to require the production and refinement of performance. measures, fiscal management, work prioritization integration, and coordination, updates to the *Accelerating Cleanup: Paths to Closure* plan and preparation of Program Execution Guidance and the life cycle baseline.			
RF-029	20,797	17,855	18,800

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

RF-030/Kaiser-Hill Project Management

The Kaiser-Hill Project Management project comprises all of the necessary Integrating Management Contractor support, direction and management for the Rocky Flats Site. This management and support are integral to the safe and efficient execution of work required to achieve accelerated cleanup and risk reduction at Rocky Flats. Much of this support and management will diminish significantly as plutonium operations are curtailed; however, in most areas, some effort will be required until all decommissioning, waste, and remediation activities are complete.

Kaiser-Hill provides planning and integration services that support the entire site by developing, implementing, and monitoring the progress of strategic plans to close Rocky Flats; assisting in the identification of performance measures; guiding the development of the annual work plan; setting standards for site-wide business practices, cost estimating and scheduling; creating and maintaining the Integrated Site-wide Baseline; maintaining project control systems; and conducting monthly program/site activity reviews. Kaiser-Hill also provides performance oversight including nuclear performance assurance, which demonstrates the readiness to conduct nuclear activities prior to actual operations; Price-Anderson Amendment Act compliance; and interfacing with the site's nuclear regulatory agencies such as the Defense Nuclear Facilities Safety Board and staff. The Integrating Management Contractor provides programmatic management for all nuclear operations, environmental remediation, and waste activities. The Integrating Management Contractor also provides the general management and oversight for all site expense funded projects.

- Manage, guide, and direct all closure projects, the Nuclear Operations Program, the architect engineer/construction/construction management subcontract and all oversight and planning exercises in a manner as such that they meet or exceed their respective program's/project's activities scheduled in the life-cycle baseline within or under budget.
- Provide safety, technical, and independent assessment programs that provide for a safe work environment in a cost-effective manner for the Rocky Flats Closure Project.
- Oversee an annual 5 percent reduction in infrastructure and management from increased efficiencies.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Ensure compliance activities, including documentation and reporting, are performed on schedule and with necessary completeness and accuracy.			
RF-030	122,949	127,068	120,731

Metrics
No quantifiable corporate performance measures are associated with this project.

RF-034/Management Project

This project supports closure of the Rocky Flats Project by managing and providing necessary and sufficient executive management, financial and administrative functions. This project includes all of the site's management (overhead), direction, general and administrative and base fees for Kaiser-Hill and their major subcontractors.

- Use re-engineering and business process improvement techniques to:
  - Improve operating efficiencies and allow an acceleration of the site closure schedule.
  - Reduce headcount and resource costs, thereby allowing additional funding to be applied to direct closure projects.
  - Finalize the consolidation of vendors and subcontractors to reduce administrative burden and cost.
  - Negotiate an extension to existing insurance programs or establish new insurance programs, as necessary, to meet site closure requirements.
  - Finalize all leases for off-site facilities, to support Closure projects and eliminate the on-site facilities costs of support organizations.
  - Finalize the extend/recompete decisions on all major subcontractors to Kaiser-Hill.
- Complete a number of computer systems and communications projects such as:
  - Remote access servers to allow an off-site workforce to continue to support closure projects.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
▸ Wireless communication integration to meet the needs of a mobile decontamination and decommissioning workforce and to allow communication to continue as buildings (and the communications infrastructure within them) are demolished.			
▸ Modularization of Telephone/Data Communications Systems to replace centralized systems and allow services to specific site population areas.			
■ Payment of contractor environmental pollution insurance premium (paid every three years).			
RF-034	95,728	94,452	100,725

Metrics
No quantifiable corporate performance measures are associated with this project.

Total, Rocky Flats	632,100	657,200	657,210

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQNP-SI01-CL/Security Investigations	
■ Increase in funding to support required reinvestigations and new investigations to be in compliance with DOE Orders.	330
RF-001/Buffer Zone Closure Project	
■ Decrease reflects completion of Trench T-1 waste treatment and shipment and equipment decontamination in FY 1999.	-3,461
RF-002/Waste Management Project	
■ Increase is due to increased shipments of transuranic waste and mixed low-level waste, and increased quantities of mixed low-level waste treatment.	11,653
RF-003/Remediation Waste & Contingent Storage Project	
■ Decrease reflects curtailment of project.	-1
RF-004/Special Nuclear Material Capital Support Project	
■ Increase is necessary to support completion and testing of cooling tower upgrade.	1,453

	FY 2000 vs. FY 1999 ($000)
RF-006/Special Nuclear Material Consolidation Project	
■ Decrease due to lower level of intra-building special nuclear material transfers as more special nuclear material is consolidated.	-947
RF-008/Plutonium Metals and Oxides Stabilization	
■ Decrease reflects completion of installation and testing of the Plutonium Packaging System in FY 1999	-1,010
RF-009/Plutonium Solid Residue Stabilization Project	
■ Increase reflects shipments of plutonium fluorides to the Savannah River Site and increased levels of stabilization for remaining residue categories, including procurement of additional pipe components.	14,994
RF-010/Plutonium Liquid Stabilization	
■ Decrease is due to project completion in FY 1999.	-8,672
RF-011/Uranium Disposition Project	
■ Decrease is due to project completion in FY 1999.	-1,048
RF-012/Special Nuclear Material Shipping Project	
■ Increase is due to transfer of funding responsibility for 9975 shipping containers from the Savannah River Site K-Area Nuclear Material Storage subproject to Rocky Flats.	10,000
RF-013/Closure Caps Project	
■ Decrease due to completion of initial design investigations for construction of the closure caps.	-30
RF-014/Industrial Zone Closure Project	
■ Decrease reflects lower landlord costs resulting from deactivation and decommissioning activities.	-3,328
RF-015/Miscellaneous Production Zone Cluster Closure Project	
■ Increase is due to slightly higher decommissioning activities for the miscellaneous facilities within the protected area.	3,481
RF-016/Building 371 Cluster Closure Project	
■ Increase due to additional support for residue stabilization, metal and oxide stabilization and special nuclear material shipping activities.	630
RF-017/Building 707/750 Cluster Closure Project	
■ Decrease reflects slightly lower costs resulting from consolidation/removal of special nuclear materials from Building 707.	-1,211
RF-018/Building 771/774 Cluster Closure Project	
■ Increase is due to slightly higher level of decommissioning activities within Building 771 Cluster.	240

	FY 2000 vs. FY 1999 ($000)
RF-019/Building 776/777 Cluster Closure Project	
■ Decrease is due to lower surveillance costs resulting from special nuclear material consolidation and holdup removal activities.	-572
RF-020/Building 881 Cluster Closure Project	
■ Decrease is due to lower surveillance costs resulting from room shutdowns within the building cluster.	-541
RF-021/Building 991 Cluster Project	
■ Decrease is due to lower storage costs for transuranic waste as a result of increased shipments to the Waste Isolation Pilot Plant.	-325
RF-022/Building 779 Cluster Closure Project	
■ Decrease reflects completion of cluster demolition by June 2000	-13,295
RF-023/Utilities and Infrastructure Project	
■ Increase is due to the expansion of infrastructure support for stabilization, shipping, and decommissioning activities.	1,331
RF-024/Safeguards and Security Project	
■ Decrease reflects reduced safeguards and security requirements due to closure of Building 771 Material Access Area and consolidation of special nuclear material.	-1,471
RF-025/Infrastructure Improvement/Replacement Project	
■ Decrease is due to completion of most capital and constructions projects in Buildings 371, 664, 115, 121, and 764 in FY 1999.	-9,756
RF-027/Analytical Services Project	
■ Increase is due to the expansion of analytical and sampling support for stabilization, shipping, and decommissioning activities.	685
RF-029/Rocky Flats Office - DOE Management	
■ Increase is due to anticipated increased activities associated with the Kaiser-Hill contract expiration in June 2000.	945
RF-030/Kaiser-Hill Project Management	
■ Decrease is due to lower contractor management costs and shift of support costs to more direct work.	-6,337
RF-034/Management Project	
■ Increase due to the environmental pollution insurance premium (paid every three years) and upgrading of the communication system.	6,273
Total Funding Change, Rocky Flats	10

Environmental
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Defense Environmental Management Privatization

Proposed Appropriation Language

For Department of Energy expenses for privatization projects necessary for atomic energy defense environmental management activities authorized by the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), [$228,357,000] *to become available on October 1 of the year specified and* to remain available until expended: *fiscal year 2000, $228,000,000; fiscal year 2001, $671,000,000; fiscal year 2002, $659,000,000; fiscal year 2003, $633,000,000; fiscal year 2004, $594,000,000. (Energy and Water Development Appropriations Act, 1999.)*

Explanation of Change

Change in appropriation language provides for advanced appropriations through fiscal year 2004.

Defense Environmental Management Privatization

Program Mission

The Department of Energy (DOE) began working with the private sector in the 1940's when it contracted to design, construct, and operate the facilities used to build nuclear weapons during the Manhattan Project. During the period of weapons production and in the early years of the Environmental Management (EM) program, the management and operating contract was the typical method of contracting. This mechanism contained very general work scope under which DOE reimbursed essentially all contractor costs while also paying the contractor an additional fee based on either a fixed fee schedule or, in a few cases, based on a subjective determination of performance (i.e. award fee).

In an effort to meet the enormous cleanup challenge in the face of declining resources, EM began utilizing, where appropriate, privatization as a mechanism to deal with these demands. Privatization is a contracting strategy that should reduce the project risk to the government and achieve cleanup more cost-effectively. Under privatization, the EM program provides financial incentives to the contractors to substantially reduce EM cleanup costs while ensuring that an appropriate technical and financial risk/reward balance between DOE and the contractors is maintained. The use of privatization is expected to result in cleanup being accomplished sooner in comparison to the traditional Management and operating approach, thus supporting the EM vision of completing substantial cleanup at most EM sites within the next decade.

As provided in the National Defense Authorization Act for Fiscal Year 1998, contracts for EM Privatization projects should meet the following criteria: be awarded on a competitive basis; require the contractor to construct or acquire any equipment or facilities required to carry out the contract; require the contractor to bear any of the costs of the construction, acquisition, operation of such equipment or facilities that arise before the commencement of the provision of goods or services under the contract; provide for payment to the contractor under the contract only upon the meeting of performance specifications in the contract. The EM focus in utilizing this methodology is to gain an edge through best-in-class management capability, business strategies, technological approaches, schedule enhancements, regulatory experience and cost efficiencies. This type of project funding is widely used in the private sector to finance power plants and other investments. The Department believes the privatization program is the most cost-effective approach for selected projects.

This program is budgeted for under the appropriation account: Defense Environmental Management Privatization. The Defense Environmental Management Privatization request for FY 2000 is $228.0 million, a decrease of $.4 million compared to the amount provided for Privatization in FY 1999. The FY 2000 privatization program, however, totals $253.0 million, supported by $25.0 million of prior year balances associated with a now canceled project. The

FY 2000 request is required to continue the Idaho Advanced Mixed Waste Treatment, the Idaho Spent Nuclear Fuel Dry Storage, the Oak Ridge Environmental Management/Waste Management Disposal Facility, the Oak Ridge Transuranic Waste Treatment and the Richland Tank Waste Remediation System privatization projects.

The Department is requesting advance appropriations for the Hanford Tank Remediation System for FY 2001 through FY 2004 and for the Idaho Advanced Mixed Waste Treatment Project for FY 2001 (FY 2001 - $671 million, FY 2002 - $659 million, FY 2003 - $633 million and FY 2004 - $594 million). The Department will consider incremental funding for other privatization projects on an annual basis.

Program Goal

The goal of Privatization is to accomplish work traditionally performed by Management and Operations/Management and Integration contractors in the cost plus contract environment in a more cost-effective manner.

Program Objectives

- Reduce the project risk to the government and achieve cleanup more cost-effectively;
- Provide financial incentives to contractors to substantially reduce EM cleanup costs while ensuring that an appropriate technical and financial risk/reward balance between DOE and the contractor is maintained; and
- Continue the active support and commitment to ongoing privatization projects aimed at reducing the overall cost of environmental cleanup activities.

Performance Measures

- Start construction of the Oak Ridge Transuranic Waste Treatment project;
- Start construction of the Richland Tank Waste Remediation System Privatization Phase 1 project; and
- Ship 3,376 cubic meters of contact-handled waste to Waste Isolation Pilot Plant assuming resolution of legal concerns.

The following list of projects were started in FY 1997 and FY 1998 and will be continued in FY 2000. There are no new starts scheduled for FY 2000.

Significant Accomplishments and Program Shifts

- In March 1998, the new Oak Ridge Management and Integration contractor initiated a rebaselining of the cleanup program in Oak Ridge including the Environmental Management/Waste Management Disposal project. A detailed review of the data contained in the Remedial Investigation/Feasibility Study cost estimate resulted in a reduction to the Total Estimated Cost of that project of $26.5 million and an increase in the Total Project Cost of $40.9 million over the projected Phase 1 span of 19 years.

- In August 1998, the Department negotiated a contract with BNFL, Inc., to proceed into Phase B of the Tank Waste Remediation System project at Hanford, Washington. In addition, in order to more effectively manage the Tank Waste Remediation System, and in response to Congressional concerns, the Secretary established the Office of River Protection at the Hanford, Washington site.

- In August 1998, the Department awarded, through competitive procurement, a contract for the treatment of Transuranic Waste to the Foster Wheeler Environmental Corporation. The contract was awarded for approximately $50 million less in Total Estimated Cost than the original Management and Operations contractor estimate.

- After very careful deliberation and examination of more refined estimates , the Department determined the privatization approach was not the most feasible for the Savannah River Spent Nuclear Fuel project. The $25.0 million originally appropriated for this project will be used to support the total FY 2000 Privatization program level of $253.0 million.

- The Total Project Cost for the Advanced Mixed Waste Treatment Project, Idaho has been revised from $1,078.9 million to $1,115.4 million as a result of the contract provision for price redetermination and economic price adjustments on the operating portion of the contract. The Total Estimated Cost of the privatized portion of the contract was not effected.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Privatization	200,000	260,357	0	260,357	253,000
Subtotal, Privatization	200,000	260,357	0	260,357	253,000
Use of prior year balances	0	0	(32,000)	(32,000)	(25,000)
Total, Privatization	200,000	260,357	(32,000)	228,357	228,000

Public Law 95-91, "Department of Energy Organization Act (1977)"
Public Law 105-245, "The Energy and Water Development Appropriations Act, 1999"
Public Law 105-261, "Strom Thurmond National Defense Authorization Act For Fiscal Year 1999"
Public Law 102-579, "Waste Isolation Pilot Plant Land Withdrawal Act (1992)"

Funding by Site

(Dollars in Thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Carlsbad Area Office (NM)	21,000	19,605	0	-19,605	-100%
Idaho Operations Office (ID)	27,000	107,252	115,000	7,748	7%
Oak Ridge Operations Office (TN)	5,000	33,500	32,000	-1,500	-4%
Richland Operations Office (WA)	115,000	100,000	106,000	6,000	6%
Rocky Flats Office (CO)	0	0	0	0	N/A
Savannah River Operations Office (SC)	25,000	0	0	0	N/A
Subtotal, Privatization	193,000	260,357	253,000	(7,357)	N/A
Undistributed	7,000	0	0	0	N/A
Subtotal, Privatization	200,000	260,357	253,000	-7,357	-3%
Use of prior year balances	0	-32,000	-25,000	-7,000	-22%
Total, Privatization	200,000	228,357	228,000	-357	0%

Detailed Program Justification

	FY 1998	FY 1999	FY 2000
CAO-6 Contact Handled Transuranic Waste Transportation; Carlsbad, New Mexico			
The Waste Isolation Pilot Plant is expected to begin receiving waste requiring specialized transportation. A private vendor will provide transportation of contact-handled transuranic waste from generator sites to Waste Isolation Pilot Plant using contractor owned and operated tractor trailer sets and nuclear packaging equipment. A standard fee will be paid based on shipments and mileage. Site-specific treatment plans developed under the Federal Facility Compliance Act and the associated consent orders and agreements with the states and EPA (across the DOE complex) require disposal of transuranic wastes. Contract award is expected to take place the third quarter of FY 1999.			
Total, CAO-6	21,000	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

	FY 1998	FY 1999	FY 2000
CAO-6 Remote Handled Transuranic Waste Transportation; Carlsbad, New Mexico			
The Waste Isolation Pilot Plant is expected to begin receiving waste requiring specialized transportation. A private vendor will provide transportation of remote-handled transuranic waste from generator sites to Waste Isolation Pilot Plant using contractor owned and operated tractor trailer sets and nuclear packaging equipment. A standard fee will be paid based on weight and mileage. Site-specific treatment plans developed under the Federal Facility Compliance Act and the associated consent orders and agreements with the states and EPA (across the DOE complex) require disposal of transuranic wastes. The Department anticipates contract award late FY 1999 or early FY 2000.			
Total, CAO-6	0	19,605	0

Metrics
No quantifiable corporate performance measures are associated with this project

FY 1998	FY 1999	FY 2000

ID-WM-104 Advanced Mixed Waste Treatment Project; Idaho Falls, Idaho

This project has been in development at the Idaho National Engineering and Environmental Laboratory since 1993. A contract was awarded to BNFL, Inc., in December 1996, for the retrieval, sorting, characterization, storage, pre-treatment, treatment, certification and loading for transportation of 65,000 cubic meters of alpha and transuranic mixed waste located in retrievable storage at the Idaho National Engineering and Environmental Laboratory Radioactive Waste Management Complex. The contract has an option for treatment of up to 120,000 cubic meters of additional Idaho National Engineering and Environmental Laboratory and DOE mixed wastes. The project scope is to treat Idaho National Engineering and Environmental Laboratory Transuranic and alpha mixed waste, as well as other DOE mixed waste in the complex, through a private sector treatment facility located at the at Idaho National Engineering and Environmental Laboratory.

The primary wastes to be treated are DOE laboratory and process wastes generated at Rocky Flats and various DOE facilities. These wastes are currently stored in drums, boxes and bins at the Idaho National Engineering and Environmental Laboratory Transuranic Storage Area of Radioactive Waste Management Complex.

FY 1998	FY 1999	FY 2000

Waste consists of a heterogeneous mixture of solid materials including paper, cloth, rubber, plastic, glass, graphite, bricks, concrete, metal, nitrate salts, process sludges, miscellaneous components and some absorbed liquids. Ninety-five percent of the waste is believed to contain both Resource Conservation and Recovery Act (RCRA) hazardous waste constituents and radioactivity. Some wastes also contain Toxic Substance and Control Act regulated materials such as polychlorinated biphenyls. No more than 4,100 kilograms (kg) of elemental mercury, and approximately 2.1 million kg of lead is expected in the 5,000 cubic meters. This project is necessary to meet the requirement in the October 1995, Idaho Settlement Agreement to ship all transuranic waste out of Idaho by the target year of 2015 and no later than 2018. It is also necessary to meet site treatment plan milestones under the Federal Facility Compliance Act. The transuranic waste will be disposed at the Waste Isolation Pilot Plant near Carlsbad, NM. Non-transuranic wastes which are not allowed to be disposed at Waste Isolation Pilot Plant (e.g. low-level and mixed wastes) will be disposed in accordance with applicable requirements.

The Advanced Mixed Waste Treatment Project is a privatized, fixed-price contract and will be performed in three phases. Phase I consists of facility permitting, preliminary facility/process design, and establishing the facility safety basis. Phase II consists of final facility/process design, facility construction, and testing. Phase III consists of facility operations, RCRA closure and Decontamination & Decommission. The service shall treat waste to meet RCRA Land Disposal Restrictions. Meeting this requirement will also fulfill Waste Isolation Pilot Plant Waste Acceptance Criteria and Toxic Substance and Control Act requirements. Transportation support for shipment of the waste from Idaho National Engineering and Environmental Laboratory to Waste Isolation Pilot Plant is required and will be performed under a separate Waste Isolation Pilot Plant-managed contract.

	FY 1998	FY 1999	FY 2000
In accordance with the Idaho Settlement Agreement, facility construction will be complete by December 2002, and operations will commence no later than March 2003. Shipments of waste from the Advanced Mixed Waste Treatment Project are expected to begin in late 2003.			
The FY 1997 appropriation of $70.0 million represented an estimate of the private sector's capital investment based on the December 1994 feasibility study. The $87.3 million appropriation for FY 1999 for this project provided for about 15 percent of the full funding for the physical construction (including major equipment) phase of this project based on the fixed price contract awarded in December 1996. The $110.0 million appropriation for FY 2000 for this project provides for about 19 percent of the full funding for the physical construction (including major equipment) and an aggregate funding level of 47 percent of the full funding for the physical construction. Future budget requests of $302.1 million will be made to cover the remainder of the construction costs. These funds will cover the remote possibility of termination of the contract. They will eventually be used to reimburse capital expenditures after service commences.			
Total, ID-WM-104	0	87,252	110,000

Metrics
No quantifiable corporate performance measures are associated with this project.

	FY 1998	FY 1999	FY 2000
ID-SNF-105 Spent Nuclear Fuel Dry Storage; Idaho Falls, Idaho			
The Spent Nuclear Fuel Dry Storage Project will provide the capabilities to initiate interim dry modular storage of Spent Nuclear Fuel at the Idaho National Engineering and Environmental Laboratory. The fuel currently resides in facilities on the Idaho National Engineering and Environmental Laboratory, at various universities and foreign research reactors. The project involves the procurement of a dry storage facility capable of transferring and cleaning spent fuel rods. The service will be provided through an open fixed-price competition. This project plays a critical role in meeting the Idaho Settlement Agreement commitment of placing all Spent Nuclear Fuel at Idaho National Engineering and Environmental Laboratory into dry storage by December 31, 2023. The Idaho Settlement Agreement stipulates compliance with these milestones to continue shipment and consolidation of reactor fuel at Idaho National Engineering and Environmental Laboratory before final disposition by 2035.			
Total, ID-Spent Nuclear Fuel-105	27,000	20,000	5,000

Metrics
No quantifiable corporate performance measures are associated with this project.

	FY 1998	FY 1999	FY 2000
OR-44901 Environmental Management/Waste Management Disposal; Oak Ridge, Tennessee			
The project provides for the purchase of waste disposal services from a private vendor for low-level, hazardous, Toxic Substance and Control Act defined, and mixed wastes generated at Oak Ridge. The contract will pay a fixed unit price for the disposal service. This project is required to support the Oak Ridge Federal Facilities Agreement and the efficient cost effective disposal of site-wide CERCLA wastes. Cleanup, decontamination and decommissioning projects at Oak Ridge are expected to produce significant volumes of contaminated soils and debris in need of permanent disposal. This project provides for creation of an on-site disposal facility with a capacity of up to 0.84 million cubic meters of wastes and the on-site disposal is supported by stakeholders. This project permits the efficient completion of numerous site projects within budget ceilings. Off-site waste shipments would not allow completion of numerous projects within the current budget caps.			
Total, OR-44901	5,000	33,500	20,000

Metrics
No quantifiable corporate performance measures are associated with this project.

	FY 1998	FY 1999	FY 2000
OR-38902 Transuranic Waste Treatment; Oak Ridge, Tennessee			
The project provides for the treatment of transuranic waste located at various areas within the Oak Ridge Reservation by obtaining the services of a private contractor through a competitive procurement for this four phase project. Phase I will be a fixed-price contract for licensing and permitting and will be funded from the base program. Phase II will consist of construction of the treatment system and any pre-testing required by Waste Isolation Pilot Plant, Nevada Test Site, or the regulatory agencies and is funded by the privatization program. Phase III will consist of removal of sludge waste from the tanks and treatment of sludge and solid waste in the licensed/permitted facility and Phase IV will consist of decontamination and decommissioning.			
Total, OR-38902	0	0	12,000

Metrics
No quantifiable corporate performance measures are associated with this project.

RL-TW06 Tank Waste Remediation System, Phase I; Richland, Washington

As part of the Reinventing Government and Contract Reform Initiatives, DOE evaluated the feasibility of privatizing all or part of the Hanford Tank Waste Remediation System. It was determined that a two Phase approach to Tank Waste Remediation System privatization was desirable, both from an economic standpoint and from the point of view of private vendors.

	FY 1998	FY 1999	FY 2000
The first of the two phases would be a commercial demonstration phase where private vendors would treat sufficient waste to demonstrate to both DOE and to the financial community that they were capable of treating the remainder of the tank waste in a larger, second phase effort. Phase II would complete the treatment of the tank wastes. In September 1996, Tank Waste Remediation System privatization contracts were awarded to teams lead by Lockheed Martin Environmental Services and BNFL, Inc.. These contracts were for Phase 1 of the Tank Waste Remediation System privatization and consisted of Part A and Part B. Part A was a twenty-month period to establish the technical, operational, regulatory, business, and financial elements required by privatization facilities that will provide tank waste treatment services on a fixed-unit-price basis. The two contractors provided required deliverables to the Department after 16 months. As a result of the analyses of these deliverables, the Department determined the Lockheed Martin Environmental Services proposal to be non-viable. On July 21, 1998, the Department delivered the *Report to Congress, Treatment and Immobilization of Hanford Radioactive Tank Waste* providing notification prior to entering into a privatization contract. After the 30-day waiting period the Department negotiated a contract to proceed with BNFL, Inc., into Phase B. However, to better define the project and quantify project risks and to enhance the contractor's ability to obtain financing, it was determined that Phase B would be further divided into Phase B-1, a 24-month design phase, and Phase B-2, the construction and operations phase. A decision point has been established for the Department to determine the viability of proceeding into Phase B-2 before BNFL, Inc. begins construction. In addition, the contract has provided for waste treatment services for both high level and low activity waste. Waste treatment is expected to begin in 2005 or 2006 and continue for about ten years.			
Total, RL-TW06	115,000	100,000	106,000

	FY 1998	FY 1999	FY 2000
Metrics No quantifiable corporate performance measures are associated with this project.			

Spent Nuclear Fuel Transfer and Storage; Savannah River, South Carolina

Upon further analysis the Department has determined that privatization is not the best alternative contracting approach for this project and is requesting that the funds be used to support the Department's total privatization request of $253.0 million in FY 2000.

Total, Spent Nuclear Fuel Transfer and Storage	25,000	0	0

Metrics No quantifiable corporate performance measures are associated with this project.			
Undistributed, Fiscal Year 1998	7,000	0	0
Total, Privatization	200,000	260,357	253,000

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Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
Carlsbad Area Office	
■ Project was fully funded in FY 1999	$-19,605
Idaho Operations Office	
■ Continues the requisite incremental funding for the Advanced Mixed Waste Treatment Project (+$22,748,000) in Idaho Falls, Idaho	+22,748
■ Reduction in the amount required for the Spent Nuclear Fuel Dry Storage Project (-$15,000,000) in Idaho Falls, Idaho	-15,000
Oak Ridge Operations Office	
■ Decrease in the amount from FY 1999 for the Environmental Management/Waste Management Disposal at Oak Ridge, Tennessee	-13,500
■ Continues the requisite incremental funding for both the Transuranic Waste Treatment projects at Oak Ridge, Tennessee	+12,000
Richland Operations Office	
■ Provides the incremental funding necessary to cover the Phase B-1 design activities of BNFL, Inc at Richland, Washington	6,000
Total Funding Change, Privatization	(7,357)

Operating Expense Funded Project Summary

(dollars in thousands)

Project Number	Project Title	TEC	Previous Approp	FY 1998 Approp	FY 1999 Approp	FY 2000 Request	Unappropriated Balance
99-PVT-1	Remote Handled Transuranic Waste Transportation, Carlsbad (WIPP) . . .	19,605	0	0	19,605	0	0
98-PVT-1	Contact Handled Transuranic Waste Transportation, Carlsbad (WIPP) . . .	21,000	0	21,000	0	0	0
98-PVT-2	Spent Nuclear Fuel Dry Storage, ID	120,000	0	27,000	20,000	5,000	68,000
98-PVT-5	Environmental Management/Waste Management Disposal, OR	58,500	0	5,000	33,500	20,000	0
97-PVT-1	Tank Waste Remediation System Privatization Phase I, RL	5,466,000	170,000 [a]	115,000	100,000	106,000	4,975,000 [b]
97-PVT-2	Advanced Mixed Waste Treatment Project, ID	569,400	70,000 [c]	0	87,252	110,000	302,148
97-PVT-3	Transuranic Waste Treatment, OR	77,000	65,000 [c]	0	0	12,000	0
Projects Removed from Privatization: [d]		0	25,000	25,000	0	0	0
Undistributed		NA	NA	7,000	NA	NA	NA
SubTotal Operating		NA	330,000	200,000	260,357	253,000	NA
Use of Prior Year Balances		NA	NA	NA	-32,000	-25,000	NA
Total Operating Funded Project, Defense Privatization		NA	330,000	200,000	228,357	228,000	NA

[a] $54.0 million was obligated in FY 1996 for Phase I, Part A – within the Defense Environmental Restoration and Waste Management Appropriation.

[b] This amount does not reflect the advance appropriation of $2.492 billion for Fiscal Years 2001 through 2004 for this project.

[c] Reflects appropriation in FY 1997 from Defense Environmental Restoration and Waste Management, Fixed Asset Acquisition/Privatization Account.

[d] Rocky Flats FY 1997 $10.0 million; Oak Ridge FY 1997 $15.0 million and Savannah River FY 1998 $25.0 million.

98-PVT-2, Spent Nuclear Fuel Dry Storage; Idaho Falls, Idaho

Significant Changes

- The Department is presently in the initial stages of the procurement process with the expectation of releasing the Request For Proposal in the near future. The increase in estimated capital cost of the project (from $87.0 million to $120.0 million) is based on information from an independent cost estimate prepared by the Army Corps of Engineers in June 1998.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request (*A-E and technical design only*)	NA		FY 1999	FY 2001	87,000	123,831
FY 1999 Budget Request (*Preliminary Estimate*)	NA		FY 1999	FY 2001	87,000	123,831
FY 2000 Budget Request (*Current Estimate*)	NA		FY 1999	FY 2003	120,000	163,750

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations [a]	Obligations [b]	Costs [c]
Design			
1997			
Construction			
1997	0	0	0
1998	27,000	0	0
1999	20,000	15,000	0
2000	5,000	35,000	13,000
2001	68,000 [d]	60,000	2,000
2002	0	10,000	0
2003	0	0	10,000
2004	0	0	40,000
2005	0	0	25,000
2006	0	0	20,000
Outyears	0	0	10,000

3. Project Description, Justification and Scope

The Spent Nuclear Fuel Dry Storage Project will provide Nuclear Regulatory Commission-licensed interim dry storage of Spent Nuclear Fuel at the Idaho National Engineering and Environmental Laboratory. The fuel currently resides in facilities on the Idaho National Engineering and Environmental Laboratory, at various universities and at foreign research reactors. This project would place approximately 50 cubic meters of Spent Nuclear Fuel into dry interim storage.

This project includes the following services:

- Dry Transfer Capability to allow dry transfer of Spent Nuclear Fuel fuel assemblies from a shipping cask into dry storage canisters.
- Independent Spent Fuel Storage Installation as defined by Nuclear Regulatory Commission regulations

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[a] Includes current contractor investment plus funds to maintain current project schedules (including allowances for items such as long-lead procurements).

[b] Includes current contractor investment plus funds to maintain current project schedules (including allowances for items such as long-lead procurements).

[c] The Department intends to make an outlay in the amount of about $13.0 million in FY 2000 for design completion and a subsequent payment in FY 2001 for licensing.

[d] This amount reflects current program baseline requirements. The Department will consider these requirements in the formulation of future budget requests.

- Loading of the designated fuels into the Independent Spent Fuel Storage Installation beginning by July 1, 2003, and completing in FY 2007. [a]
- Operation of Dry Transfer Facility and Independent Spent Fuel Storage Installation through 2007.

An October 17, 1995, Federal court-ordered agreement between the State of Idaho, DOE, and the Navy directs that all spent nuclear fuel will be out of wet storage by 2023 and shipped out of the State of Idaho by 2035. The Order additionally mandates an "appropriation request for fiscal year 1998 for DOE to initiate procurement of dry storage at the Idaho National Engineering and Environmental Laboratory." The Order requires initiation of Spent Nuclear Fuel loading into dry storage by July 1, 2003, and that a multi-purpose canister or equivalent (licensed for storage and transportation) dry storage system must be provided.

The feasibility of modifying existing Idaho National Engineering and Environmental Laboratory facilities to provide these functions was evaluated. It was determined that new facilities would be needed to meet programmatic requirements. Reasons behind this determination include:

- The cost of modifying existing Idaho National Engineering and Environmental Laboratory facilities, including life-cycle costs, is not significantly lower than the cost of new facilities.
- A technical scope that includes modification of existing Idaho National Engineering and Environmental Laboratory facilities is not considered suitable for a privatization contract.
- The cost of attempting to obtain Nuclear Regulatory Commission license for existing Idaho National Engineering and Environmental Laboratory facilities, as well as the associated technical issues of licensing DOE-regulated facilities, would be cost and schedule prohibitive.
- The dry transfer and interim storage facilities may be needed to transfer the other DOE-owned Spent Nuclear Fuel to dry storage. The total life span of these facilities is estimated to be 35 to 40 years. Project scope is limited to those fuels specified in the Request for Proposal.

The project would be constructed at the Idaho Nuclear Technology and Engineering Center, formerly known as the Idaho Chemical Processing Plant.

The Spent Nuclear Fuel will be received in a wide variety of shipping casks from off-site and on-site shipments. The successful contractor will handle selected fuel types that, based on currently available fuel condition data (records verification only), are believed to be undamaged and have intact cladding. However, these selected fuels may require special handling and treatment to meet Nuclear Regulatory Commission requirements for placement in an Independent Spent Fuel Storage Installation.

Waste generated by fuel transfer should be minimized, but waste stream disposal shall be the responsibility of the successful bidder. The fuel will not be disposed of in Idaho and fuel disposal is not within the scope of this contract. The Request for Proposal mandates the use of the preliminary design specifications for standardized Spent Nuclear Fuel canisters.

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[a] The October 17, 1995 Consent Order does not drive the end date for this particular project The project completion date may be subject to change with negotiation of amortization schedules with the private sector.

The funding request for Privatization allows DOE to award the contract for storage services. The funds also cover design and licensing, construction costs of the dry transfer facility, procurement of the storage canisters, and the dry storage system units. Completion of the firm fixed lump sum price design and licensing deliverable (which includes acceptance of the license application(s) by the Nuclear Regulatory Commission and issuance of the license) will result in two payments to the contractor using privatization funds. A payment is planned to be made after design completion (FY 2000) and subsequent submittal and acceptance of the license application by the Nuclear Regulatory Commission (FY 2001). A second payment will be made after the Nuclear Regulatory Commission issues the license. The firm fixed price cost to construct the facilities will be amortized over a portion of fuel processed and paid out as fixed unit prices. Also, if it would become necessary, these funds will also cover termination of the contract for the convenience of the Government.

The increase in estimated capital cost of the project (from $87 million to $120 million) is based on information from an independent cost estimate prepared by the Army Corps of Engineers in June 1998. The project schedule has also been revised to be consistent with the 1995 Consent Order with the State of Idaho. This independent cost estimate represents the best estimate of projected cost at the present time because the Department has not yet received bids from the vendors. The construction data sheet will be revised when the Department awards a contract after providing the appropriate report to Congress. The Department expects to issue the final Request for Proposal in the 2nd quarter, FY1999.

In addition to the privatization request, a total of $24.9 million will be provided from the Defense Environmental Restoration and Waste Management Appropriation to make payments to the vendor for dry transfer and interim storage operations from 2003 through 2007. The other costs ($18.5 million) include support activities required by the Management and Operations contractor to develop the initial procurement specifications and deliver spent nuclear fuel to the successful vendor in the outyears.

4. Details of Cost Estimate [a]

(Dollars in Thousands)

	Current Estimate	Previous Estimate
Total, Engineering design inspection and administration of construction costs	15,000	7,000
Total, Construction Costs	92,000	75,000
Total, Project management and indirect costs	13,000	5,000
Total, line item costs	120,000	87,000

[a] The estimate details are unavailable as they may unnecessarily influence the procurement process; bids are expected in FY 1999.

5. Method of Performance

The dry transfer capability and Independent Spent Fuel Storage Installation would be licensed by the Nuclear Regulatory Commission. The design life for the Independent Spent Fuel Storage Installation is 40 years and the design life for the dry storage canisters is a minimum of 40 years. Nuclear Regulatory Commission licensing of the Independent Spent Fuel Storage Installation would be for a 20 year period with a possible extension for another 20 years. The financing, design, permitting, construction, and operation are the responsibility of the contractor. The cost estimate is based on the assumption that the 10 CFR 72.30.c (1) financial assurance requirement for Decontamination and Decomissioning can be satisfied through a commitment from DOE and not prepayment by the private contractor. After completion of dry transfer of the selected fuel types to the Independent Spent Fuel Storage Installation, the Department will have the right to exercise an option to transfer and store additional fuel. The first phase of the project will be paid on a fixed-price, lump-sum basis upon completion of specified deliverables. Cost of construction and start-up will be amortized over the first portion of fuel processed. The contractor will be paid when spent fuel assemblies are placed in dry storage based on fixed unit prices determined at the time of contract award.

The schedule calls for using a streamlined procurement in which the Request for Proposal will be issued during the second quarter of FY99 and the contract awarded within six months.

6. Schedule of Project Funding

(Dollars in Thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Payments to Vendors	0	0	0	13,000	107,000	120,000
Other Project Cost						
Facility Operations payments to vendors	0	0	0	0	24,900	24,900
Facility Support – M&O support/Other	0	991	1,290	0	16,569	18,850
Total, Other Project Cost	0	991	1,290	0	41,469	43,750
Total Project Cost	0	991	1,290	13,000	148,469	163,750

7. Related Annual Funding Requirements

	(FY 2003 dollars in thousands) Current Estimate	Previous Estimate
Giving the nature of the privatization contract, these operating costs are shown as part of the Total Project Cost.	N/A	N/A
Total related annual funding (operating from FY 2003 through FY 2007)	N/A	N/A

98-PVT-5, Environmental Management/Waste Management Disposal; Oak Ridge, Tennessee

Significant Changes

- The initial estimate to support the FY 1998 Total Estimated Cost was developed July 1997 in support of the Remedial Investigation/Feasibility Study document completed for this project in February of 1998. The evaluation of alternatives and supporting cost estimate data for development of the Remedial Investigation/Feasibility Study was being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act process. The FY 1998 reported Total Estimated Cost was based on this preliminary estimate. In March of 1998, the new Oak Ridge Management and Integration contractor initiated rebaselining of the cleanup program in Oak Ridge, including this project. A detailed review of the assumptions, construction method of accomplishment and other related data contained in the Remedial Investigation/Feasibility Study cost estimate resulted in the reduced Total Estimated Cost as indicated below. Further, the more detailed assessment of required out year activities resulted in the increase of the Total Project Cost as indicated below.
- In December 1998, three vendors provided preliminary designs and economic analyses. Following the issuance of the Record of Decision and submittal of the Privatization Project report to Congress in September 1999, a second contract will be awarded to complete the design, construction, and operations of the facility. The Request for Proposals for this procurement will be issued by March 1999.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request (*A-E and Total Estimated Costhnical design only*)	NA	NA	FY 1999	FY 2001	85,000	170,000
FY 1999 Budget Request (*Preliminary Estimate*)	NA	NA	FY 1999	FY 2001	85,000	185,000
FY 2000 Budget Request (*Current Estimate*)	NA	NA	FY2000	FY 2001	58,500	225,880

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations [a]	Obligations [b]	Costs
Design			
1997	0	0	0
Construction			
1997	0	0	0
1998	5,000	0	0
1999	33,500	2,400	0
2000	20,000	34,700	0
2001	0	21,400	34,000
2002	0	0	24,500
2003	0	0	0
2006	0	0	0
Outyears	0	0	0

3. Project Description, Justification and Scope

The envisioned Environmental Management/Waste Management Disposal Facility consists of a disposal cell with ancillary facilities to support initial operations and an area for the potential development for future treatment, storage, and disposal facilities. The disposal cell will have an initial capacity of 305,840 cubic meters (400,000 cubic yards), will be above-grade, and will be a Resource Conservation and Recovery Act compliant earthen structure. The cell will also have expansion capacity to accommodate up to 0.84 million cubic meters (1.1 million cubic yards). Based on projected waste volumes and cell design assumptions, the disposal cell is estimated to require 60-70 acres, with a total Environmental Management/Waste Management Disposal Facility footprint of 100-120 acres, including initial support facilities and an area reserved for future expansion.

Support facilities required for initial operations include those needed for waste staging, temporary storage, and equipment decontamination. An area reserved for future potential expansion would accommodate future facility needs not fully defined at this time. For example, while waste generators will be responsible for treatment to satisfy Resource Conservation and Recovery Act Land Disposal Regulations and the facility's Waste Acceptance Criteria, treatment facilities may be located at the Environmental Management/Waste Management Disposal Facility in the future to enhance overall efficiency of operations.

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[a] For multi-year funded projects, appropriation is needed a year ahead of contract commitments to preclude Anti-Deficiencies. However, appropriation in excess of contract commitments is requested in order to provide confidence to potential contractors during procurement activities of the support the Department has for this project.

[b] Includes current contractor investment plus funds to maintain current project schedules (including allowances for items such as long-lead procurements).

The Department of Energy expects the Environmental Management/Waste Management Disposal Facility to offer several benefits. On-site disposal capacity will streamline and expedite cleanup activities. Large volumes of waste from the cleanup of Oak Ridge Reservation are expected to make off-site transportation and disposal costs significantly higher than on-site disposal costs. Removal of additional waste sources would reduce the total risk at the Oak Ridge Reservation. Consolidating waste management and disposal activities as opposed to capping multiple, discrete waste units in place with continued maintenance and institutional controls would reduce the future mortgage for the Oak Ridge Reservation.

A total of $58.5 million is required for the purposes of subcontracting initial construction of the Environmental Management/Waste Management Disposal Facility that includes design and construction for a 400,000 cubic yard facility and ancillary support structures. These funds will also cover the remote possibility of termination of the contract. They will eventually be used to reimburse capital expenditures after services commence.

Future budget requirements, extending through 2010, in the amount of $121.3 million will be made within the Defense Environmental Restoration and Waste Management Appropriation, for the purpose of operations, capital facility expansion (including capping/closure of the expanded facility) for the Environmental Management/Waste Management Disposal Facility. The combination of the Privatization funds and the operating funds will be used to make payments to the vendor for the contractually required placing of material in the Environmental Management/Waste Management Disposal Facility. An additional $46.1 million from the Defense Environmental Restoration and Waste Management appropriation will provide for support of the privatization effort by the Management and Integration contractor. The estimates in this request exclude the long term surveillance and maintenance.

4. Details of Cost Estimate [a]

	(Dollars in Thousands) Current Estimate	Previous Estimate
Design Costs (8.0% of Total Estimated Cost)	4,619	5,800
Total, Design Costs	4,619	5,800
Construction Costs:		
Construction Costs (45% of Total Estimated Cost)	25,356	52,500
Capping Costs (17% of Total Estimated Cost) (unescalated)	9,889	0
Closure Costs (2% of Total Estimated Cost) (unescalated)	939	0
Total Construction Costs	36,184	52,500
Contingencies and Escalation (13% of Total Estimated Cost)	7,644	0
Total Contingencies and Escalation	7,644	0
Project Management and Other Project Costs	0	13,500
Total, Base Project Costs	48,447	71,800
Privatization Interest on Design/Construction (17% of Total Estimated Cost)	10,053	13,200
Total Project Costs	58,500	85,000

5. Method of Performance

DOE has developed a funding approach to construct the Environmental Management/Waste Management Disposal Facility without impacting the remediation it is intended to support. DOE is pursuing privatization of the facility by purchasing disposal services from a private sector vendor. Several alternatives have been evaluated for disposal of wastes generated by remediation activities at the Oak Ridge Reservation. One alternative considered in the Feasibility Study is the construction and operation of the Environmental Management Waste Management Disposal Facility on the Oak Ridge Reservation. If on-site disposal is the selected alternative in the Record of Decision, DOE will develop the performance specifications and will commit to obtaining the necessary permits. In December 1998, three vendors provided preliminary designs and economic analyses. Following issuance of the Record of Decision and submittal of the Privatization Project report to Congress in September 1999, a second contract award will be made to complete the design, construction, and operations of the facility. The Request for Proposals for this procurement will be issued by March 1999. Capital cost for the facility is recouped through the operator's unit cost disposal fee negotiated in the second contract. The performance specification will minimize design, construction, and operational uncertainties and avoid unnecessary constraints. This will result in less risk to the vendor, which should be reflected in a lower unit costs.

[a] The annual escalation rates assumed for FY 1998 through FY 2002 are 2.5%,2.8%, 3.0%,3.1%, 3.3%, 3.4%, and 3.4% respectively.

6. Schedule of Project Funding

(Dollars in Thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Payments to Vendors	0	0	0	0	58,500	58,500
Other Project Cost						
Facility Operations – payments to vendors	0	0	0	0	121,253	121,253
Facility Support – M&O support/Other	0	1,500	6,853	2,785	34,989	46,127
Total, Other Project Cost	0	1,500	6,853	2,785	156,242	167,380
Total Project Cost	0	1,500	6,853	2,785	214,742	225,880

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Given the nature of the privatization contract, these operating costs are shown as part of the Total Project Cost		
Total related annual funding	NA	NA

97-PVT-1, Tank Waste Remediation System Privatization Phase 1; Hanford, Washington

Significant Changes

- In Fiscal Year 1998, the Department completed analysis of deliverables from Lockheed Martin Environmental Services and BNFL, Inc. under Part A of the privatization contract. The Lockheed Martin Environmental Services proposal was determined to be non-viable. In August 1998, the Department negotiated a contract to proceed with BNFL, Inc., into Phase B. However, to better define the project and quantify project risks and to enhance the contractor's ability to obtain financing, it was determined that Part B would be further divided into Part B-1, a 24-month design phase, and Part B-2, the construction and operations phase. In addition, the contract has provided for waste treatment services for both high level waste and low activity waste in a full scale production facility. Under this new two phase approach, waste treatment is now expected to begin in FY 2005 or FY 2006 and continue for about 10 years. This reflects a change from the original plan, which was to have contractors who successfully completed Part A proceed to Part B. Under Part B, the contractors would provide low-activity waste and optional high level waste treatment plants, and immobilize wastes as a demonstration phase expected to begin in FY 2002, with full scale production occurring under Phase II.
- In order to more effectively manage the Tank Waste Remediation System and in response to Section 3139 of the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999*, the Secretary of Energy also established the Office of River Protection at the Hanford, Washington, site. The Manager of this Office will be a high level Departmental management official responsible for managing all aspects of Tank Waste Remediation System including the privatized contract for treatment and immobilization of tank waste and the non-privatized operations, maintenance, engineering and construction activities in the tank farms.

1. Construction Schedule History

	Fiscal Quarter					
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete	Total Estimated Cost ($000)	Total Project Cost ($000)
FY 1998 Budget Request (*A-E and technical design only*)	N/A	N/A	FY 2000	FY 2002	1,450,000	3,954,000
FY 1999 Budget Request (*Preliminary Estimate*)	Jun 1998	Dec 1999	FY2000	FY2002	1,450,000	5,144,000
FY 2000 Budget Request (*Current Estimate*)	Aug 1998	Jul 2001	FY2001	FY2007	5,466,000	12,488,000

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations [a]	Obligations [b]	Costs [c]
Design			
1997	$170,000 [d]	$0	$0
1998	$115,000	20,000	0
1999	100,000	155,000	0
2000	106,000	219,000	50,000
Construction			
2001	606,000	703,000	0
2002	659,000	659,000	0
2003	633,000	633,000	0
2004	594,000	594,000	58,000
2005	598,000	598,000	188,000
2006	564,000	564,000	401,000
Outyears	1,321,000	1,321,000	4,769,000

3. Project Description, Justification and Scope

Radioactive waste has been stored in large underground storage tanks at the Hanford Site since 1944. Approximately 54 millions gallons of waste containing approximately 240,000 metric tons of processed chemicals and 250 mega-curies of radionuclides are currently being stored in 177 tanks. These caustic wastes are in the form of liquids, slurries, saltcakes, and sludge. In 1992, the Tank Waste Remediation System Program was established to manage, retrieve, treat, immobilize, and dispose of these wastes in a safe, environmentally sound, and cost-effective manner. The integrated Tank Waste Remediation System program was designed to include efforts to resolve a number of safety concerns and technical issues and to address past leakage from some of the underground storage tanks which have contaminated the vadose zone and, recent reports indicate, could have contributed to contamination of the ground water. Storage in the current tanks is very costly; and, as the tanks age, potential for radioactive and chemical release increases, although short-term risks are low. The Tank Waste Remediation System program will substantially decrease

[a] For multi-year funded projects, appropriation is needed a year ahead of contract commitments to preclude Anti-Deficiencies. M&I support costs to deliver Phase I minimum order quantity of 6% to 13% of tank wastes is $2.0 billion.

[b] Includes current contractor investment plus funds to maintain current project schedules (includes allowances for items such as long-lead procurements).

[c] Reflects latest known outlay projection and may be different from the outlays used in developing the FY 1999 Congressional Budget.

[d] Office of Environmental Management Base Program appropriation of $54.0 million was obligated in FY 1995 and FY 1996 for Phase 1, Part A. These funds are part of "Other Project Costs", and are reflected in Section 6 of this data sheet.

the long-term costs and provide long-term protection of public health and safety and the environment by removing the wastes from the tanks and providing a waste form suitable for long term disposal.

The Tank Waste Remediation System pathway for cleanup is formally documented in the Hanford Federal Facility Agreement and Consent Order, commonly known as the Tri-Party Agreement. Under the Tri-Party Agreement, DOE, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology have agreed to a 30-year timetable for cleanup of the Hanford Site. Key dates related to the privatization found in the Tri-Party Agreement are start construction of High Level Waste pretreatment facility by June 2001 (Tri-Party Agreement M-50-04-T01), start hot operations Phase 1 Pretreatment and Immobilization Facilities by December 2002 (Tri-Party Agreement M-60-12), and completion of Pretreatment and Immobilization of all Hanford low activity waste by December 2024 (Tri-Party Agreement M-0-00). Changes to these dates will be negotiated with the parties to the Tri-Party Agreement to be consistent with the Part B contract schedule.

The Hanford Site processed more than 100,000 metric tons (110,000 tons) of uranium and generated several hundred thousand metric tons of wastes. The wastes include: high-level wastes (i.e., cesium-137 and strontium-90), low-level wastes, and hazardous wastes, which may exhibit dangerous characteristics of ignitability, corrosivity, reactivity, and toxicity. All of the waste is stored at Hanford and is being addressed in the Tank Waste Remediation System Program.

As part of the Reinventing Government and Contract Reform Initiatives, DOE evaluated the feasibility of privatizing all or part of the Hanford Tank Waste Remediation System. It was determined that a two-phase approach to Tank Waste Remediation System privatization is desirable, both from an economic standpoint and from the point of view of private vendors. The Tank Waste Remediation System project is now managed by the Manager, Office of River Protection.

Phase I will be an effort whose objectives are to: demonstrate the technical and business viability of using privatized facilities to treat Hanford tank waste; define and maintain required levels of nuclear, radiological, and occupational safety; maintain environmental protection and compliance; and substantially reduce life-cycle costs and time required to treat Hanford tank waste. Phase I consists of two parts. Part A was a 22-month period to establish the technical, operational, regulatory, business, and financial elements required by privatized facilities that will provide tank waste treatment services on a fixed-unit-price basis. BNFL, Inc. successfully completed all Phase 1, Part A technical requirements and was awarded a contract to complete Phase I, Part B in August 1998.

BNFL, Inc., has been authorized to proceed with Phase 1, Part B, which will be a period of 19 years during which that vendor will finance, design, construct, operate, and deactivate the waste-treatment facility. Part B will result in treatment of approximately 6 to 13 percent of the 54 million gallons of high-level tank waste in Hanford's storage tanks. Phase 1, Part B will have two segments, B-1 and B-2. During B-1, BNFL Inc., will design the facility, further develop regulatory requirements, and establish financing and fixed unit prices for treatment and immobilization of the high-level wastes. At the end of Part B-1, DOE will decide whether to proceed with Part B-2. During Part B-2, DOE will pay fixed unit prices for completion and acceptance of waste-treatment services according to contract specifications.

The contract with BNFL, Inc., requires BNFL, Inc., to perform value engineering studies to identify potential technologies, process flows, productivity improvements, etc., to improve cost and schedule performance.

The Department also continues its efforts to find innovative ways to drive down cost of financing and reduce risks by identifying alternative technologies.

During Phase II, after completion of Phase I, DOE plans to complete processing the remaining tank waste through a second competitive procurement. The Phase II plan will be based on information and experience gained from Phase I.

In Phase I, wastes will be retrieved from the tanks and separated into low-activity and high level waste. These wastes will be immobilized for storage and disposal according to specifications which meet all Federal and State regulations. DOE will retain oversight responsibility for radiological and nuclear safety and for certain aspects of environmental compliance. The regulatory approach will be to use, when possible, established and functioning external regulatory authorities.

BNFL, Inc., will be responsible for protection of human health and the environment from radioactive materials, hazardous materials, contamination from dangerous wastes, and non-radiological worker safety and health from conventional hazards.

The *Report to Congress - Treatment and Immobilization of Hanford Radioactive Tank Waste*, dated July 1998, provided the decision process used by the Department in proceeding into Part B-1 with BNFL, Inc.. Additional detail was also provided on the business, financial, regulatory, technical, and management aspects of the BNFL, Inc. contract.

The cost of Tank Waste Remediation System Privatization has increased over the costs presented in the FY 1999 Congressional Budget as a result of the Department proceeding with a facility capable of operating for 30 years. By proceeding with the BNFL, Inc., concept the Department has a greater range of technical and operational options than originally envisioned in the FY 1999 Congressional Budget. These options provide the ability to lower the total life cycle costs of treating the Hanford Tank Waste.

Prior year appropriations of $385.0 million and the FY 2000 appropriation of $106.0 million will be used to authorize BNFL, Inc., to proceed with Part B of the contract for waste treatment. It is anticipated that there will be two primary work scopes accomplished in FY 2000 by the Tank Waste Remediation System privatization contractor: (1) the completion of detailed approximately 30 percent design and (2) the ordering of long-lead time material.

BNFL, Inc., will be required to reach financial closure (obtaining private sector financing for the construction of their facility) prior to the start of construction. In order to obtain financing BNFL, Inc., will have to complete approximately 30 percent design work. Detail design work involves the development of all structural detail drawings, mechanical systems design and detail drawings, electrical design and detail drawings, and all radiological, nuclear and process safety analyses required to support the design work.

During the development of the detail drawings, BNFL, Inc., will start to order the long-lead time materials required to support the construction of the facility, typically those items that require several years to obtain once the order is submitted. Structural long-lead time material would include any special structural members (unusual forms or sizes). Mechanical long-lead time materials include the cesium ion exchangers, Hastalloy tanks, Hastalloy piping, Hastalloy fittings, the low activity waste and high level waste melters, and their respective control systems. Special distributive control systems will be ordered downstream to

be completed prior to installation. The Department has a decision point for proceeding with BNFL, Inc. from Phase B-1 to Phase B-2 establishing a notice to proceed to construction in August 2000.

The appropriations will also cover the remote possibility of termination of the contract. The funds will eventually be used to reimburse capital expenditures after waste treatment services begin.

Fiscal Year 1996 funding of $54.0 million from within the Defense Environmental Restoration and Waste Management Appropriation, Waste Management Program, was used to award Phase 1, Part A of the contract, and was costed in FY 1998.

Outlays from the Defense Environmental Restoration and Waste Management Appropriation may be costed in FY 2000 and FY 2001 to maintain BNFL in a position to proceed into Part B-2 in the event that negotiations between the Department and BNFL; the Department's decision making and the Congressional review do not occur within the 24 month time frame for Part B-1.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Facility Construction	5,251,881	1,651,000
Facility Operations	1,724,047	1,438,318
Deactivation	214,119	172,366
Financing	2,528,848	439,000
Taxes	1,130,215	680,000
Fee/Profit	1,638,890	763,316
TOTAL	12,488,000	5,144,000

5. Method of Performance

In September 1996, DOE awarded contracts to two teams led by the BNFL, Inc., and Lockheed Martin Advanced Environmental Services. The contracts were for the Phase 1, Part A of this project. The contractors were requested to demonstrate the technical and business viability of using privatized facilities to treat and immobilize Hanford tank wastes; define and maintain required levels of nuclear, radiological and occupational safety; maintain environmental protection and compliance; and reduce life-cycle costs and remediation time. Based on their technical submittals, the Department selected BNFL to proceed with Phase I, Part B. In Part B, BNFL will finance, design, construct, operate, and deactivate their own facilities. Site infrastructure support to include Tank Retrieval systems, roads, utilities, etc. will be provided by the government utilizing the existing Management and Integration contractor. Phase I is expected to last 19 years and process approximately 6 percent to 13 percent of the tank waste volume.

BNFL, Inc., must finance the project, design the equipment and facility, apply for and receive required permits and licenses, construct the facility and bring it on-line, operate the facility to treat waste, and deactivate the facility. The contractor can recover the resources it has invested only through the delivery of acceptable services paid for by DOE on a fixed-unit-price basis. The underlying intent is to transfer the

primary share of the financial, performance, and operational responsibility for the treatment effort from the Government to the contractor.

6. Schedule of Project Funding and Other Related Funding Requirements

(Dollars in Thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Payments to Vendors	0	0	0	50,000	5,416,000	5,466,000
Other Project Cost						
Facility Operations – payments to contractor		54,000 [a]	0	0	5,016,000	5,070,000
Facility Support – M&O support/Other [b]	0	101,000	112,000	133,000	1,597,000	1,952,000
Total, Other Project Cost	0	155,000	112,000	133,000	6,613,000	7,022,000
Total Project Cost	0	155,000	112,000	183,000	12,029,000	12,488,000

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Given the nature of the privatization contract, these operating costs are shown as part of the Total Project Cost.		
Total related annual funding	NA	NA

[a] Represents payment to competing vendors for demonstration under Phase 1 which was funded from the EM base operating program.

[b] Facility infrastructure support (e.g. utilities, fire protection, etc.) are budgeted in the Defense Environmental Restoration and Waste Management, Post 2006 Completion Appropriation for the Richland Operations Office.

97-PVT-2, Advanced Mixed Waste Treatment Project, Idaho Falls, Idaho

Significant Changes

- Total Project Cost has been revised from $1,078.9 million to $1,115.4 million. The increase is due to a change in the production schedule from the initial forecast. An increase of $7.8 million to life cycle cost results from escalated unit prices being applied to larger production quantities in later periods than were originally planned.

  The second factor is a change in the escalation rates from the OMB required rates used in the initial estimates to the economic index based escalation negotiated in the Advanced Mixed Waste Treatment Project contract. This change resulted in increased estimated life cycle costs of $28.7 million.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request (*A-E and technical design only*) ...	n/a	n/a	4Q 1999	1Q 2003	569,400 [a]	1,173,000 [b]
FY 1999 Budget Request (*Preliminary Estimate*)	n/a	n/a	4Q 1999	1Q 2003	569,400	1,078,900
FY 2000 Budget Request (*Current Estimate*)	n/a	n/a	4Q 1999	1Q 2003	569,400	1,115,400

[a] These estimates are based on a negotiated firm fixed price contract with a commercial firm. The contract includes a provision for price redetermination and economic price adjustment on the operating portion of the contract (Phase III). However, the capital portion of this contract is not subject to either price redetermination or economic price adjustment and is fixed.

[b] The Total Project Cost as defined here is the combined value DOE believes will be necessary to pay for the products or services contractually agreed upon plus other support costs. It includes Budget Authority requests for Privatization of $569.4 million; EM Base Program requests for direct payments to the vendor for Licensing and Permitting of $16.3 million, Facility Operations of $434.8 million, and D&D of $22.7 million. It also includes $67.4 million of M&O support and $4.8 million of other project office costs (e.g. NEPA).

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs [a]
Design			
1997			
Construction			
1997	70,000	0	0
1998	0	11,497	0
1999	87,252	115,839	0
2000	110,000	109,530	0
2001	65,000 [b]	64,740	0
2002	40,000 [b]	39,669	0
2003	105,000 [b]	104,877	22,700
2004	92,148 [b]	123,248	102,300
2005	0	0	159,400
2006	0	0	159,400
Outyears	0	0	125,600

3. Project Description, Justification and Scope

This project has been in development at the Idaho National Engineering and Environmental Laboratory since 1993. A contract was awarded to British Nuclear Fuels Limited, Inc., on December 20, 1996, for the retrieval, sorting, characterization, storage, pre-treatment, treatment, certification, and loading for transportation of 65,000 cubic meters of alpha and transuranic mixed waste located in retrievable storage at the Idaho National Engineering and Environmental Laboratory Radioactive Waste Management Complex. The contract has an option for treatment of up to 120,000 cubic meters of additional Idaho National Engineering and Environmental Laboratory and DOE mixed wastes. The project scope is to treat Idaho National Engineering and Environmental Laboratory alpha and Transuranic mixed waste, as well as other DOE mixed waste in the complex, through a private sector treatment facility located on the Radioactive Waste Management Complex at Idaho National Engineering and Environmental Laboratory.

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[a] This cost profile represents the annual liability increase to the government for this project based on work performed by the contractor. The liability is liquidated as waste is treated (see costs above). The cost profile has been changed to reflect BNFL's latest production schedule.

[b] The amounts shown for FY 2001 through FY 2004 reflect current program baseline requirements. The Department will consider these requirements in the formulation of future budget requests.

2. Financial Schedule

(dollars in thousands)			
Fiscal Year	Appropriations	Obligations	Costs [a]
Design			
1997			
Construction			
1997	70,000	0	0
1998	0	11,497	0
1999	87,252	115,839	0
2000	110,000	109,530	0
2001	65,000 [b]	64,740	0
2002	40,000 [b]	39,669	0
2003	105,000 [b]	104,877	22,700
2004	92,148 [b]	123,248	102,300
2005	0	0	159,400
2006	0	0	159,400
Outyears	0	0	125,600

3. Project Description, Justification and Scope

This project has been in development at the Idaho National Engineering and Environmental Laboratory since 1993. A contract was awarded to British Nuclear Fuels Limited, Inc., on December 20, 1996, for the retrieval, sorting, characterization, storage, pre-treatment, treatment, certification, and loading for transportation of 65,000 cubic meters of alpha and transuranic mixed waste located in retrievable storage at the Idaho National Engineering and Environmental Laboratory Radioactive Waste Management Complex. The contract has an option for treatment of up to 120,000 cubic meters of additional Idaho National Engineering and Environmental Laboratory and DOE mixed wastes. The project scope is to treat Idaho National Engineering and Environmental Laboratory alpha and Transuranic mixed waste, as well as other DOE mixed waste in the complex, through a private sector treatment facility located on the Radioactive Waste Management Complex at Idaho National Engineering and Environmental Laboratory.

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[a] This cost profile represents the annual liability increase to the government for this project based on work performed by the contractor. The liability is liquidated as waste is treated (see costs above). The cost profile has been changed to reflect BNFL's latest production schedule.

[b] The amounts shown for FY 2001 through FY 2004 reflect current program baseline requirements. The Department will consider these requirements in the formulation of future budget requests.

The primary wastes to be treated are DOE laboratory and process wastes from Rocky Flats and various DOE facilities. These wastes are currently stored in drums, boxes, and bins at the Idaho National Engineering and Environmental Laboratory Transuranic Storage Area of Radioactive Waste Management Complex. Wastes consist of a heterogeneous mixture of solid materials including paper, cloth, plastic, rubber, glass, graphite, bricks, concrete, metals, nitrate salts, process sludges, miscellaneous components and some absorbed liquids. Ninety-five percent of the waste is believed to contain both RCRA hazardous waste constituents and radioactivity. Some wastes also contain Toxic Substances and Control Act regulated materials such as polychlorinated biphenyls. No more than 4,100 kilograms (kg) of elemental mercury, and approximately 2.1 million kg of lead is expected in the 65,000 cubic meters. The transuranic waste will be disposed of at the Waste Isolation Pilot Plant near Carlsbad, NM. Non-transuranic wastes which are not allowed to be disposed of at Waste Isolation Pilot Plant (e.g. low-level and mixed low-level wastes) will be disposed of in accordance with applicable waste disposal requirements.

This project is necessary to process alpha contaminated and transuranic mixed waste to produce a disposal ready waste that meets all current requirements for storage, transportation and disposal, including the Waste Isolation Pilot Plant Waste Acceptance Criteria and RCRA Land Disposal Restrictions. The treatment process will size and/or re-package waste into standardized containers; destroy Polychlorinated biphenyls, eliminate excess liquids and corrosive characteristics; minimize volatile organic compounds and hydrogen gas generation; and reduce hydrogen layers to increase the wattage (radioactive components) allowed per container.

This project is necessary to meet the requirement in the October 1995 Idaho Settlement Agreement to ship all Transuranic waste out of Idaho by 2015 (target) and no later than 2018. It is also necessary to meet site treatment plan milestones under the Federal Facility Compliance Act. In accordance with the agreement, facility construction will be completed by December 31, 2002, and operations will commence no later than March 31, 2003. Shipments of waste from the Advanced Mixed Waste Treatment Project are expected to begin in late 2003. The State of Idaho will provide RCRA and Clean Air oversight. The EPA Region 10 will provide oversight of the Toxic Substances and Control Act permit.

The FY 1997 appropriation of $70.0 million represented an estimate of the private sector's capital investment based on the December 1994 Feasibility Study. The budget for FY 1999 of $87.3 million and the Budget Request for FY 2000 of $110.0 million for this project provides funding for the initiation of physical construction (including advance procurement of major equipment) phase of this project. These funds will also cover the remote possibility of termination of the contract. They will eventually be used to reimburse capital expenditures after services commence.

Future budget requests will be made within the Defense Environmental Restoration and Waste Management Appropriation for the purpose of making payments to the vendor - $434.8 million for operations and $22.7 million D&D. An additional $65.4 million from the appropriation will be requested to provide M&O support for the privatization effort and $1.2 million for other project office costs..

4. Details of Cost Estimate

Total Capital cost is estimated to be $569.4 million based on the fixed-price contract awarded in December 1996.

5. Method of Performance

The Advanced Mixed Waste Treatment Project is a privatized, fixed-price contract and will be performed in three phases. Phase I consists of facility permitting, preliminary facility/process design, and establishing the facility safety basis; Phase II consists of final facility/process design, facility construction and testing; Phase III consists of facility operations, RCRA Closure & Decontamination & Decommission. The services shall treat waste to meet RCRA Land Disposal Restrictions. Meeting this requirement will also fulfill Waste Isolation Pilot Plant Waste Acceptance Criteria, and Toxic Substances and Control Act requirements. Transportation support for shipment of the wastes from Idaho National Engineering and Environmental Laboratory to Waste Isolation Pilot Plant is required and will be performed under a separate Waste Isolation Pilot Plant managed contract.

6. Schedule of Project Funding

(Dollars in Thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Payments to Vendors . .	0	0	0	0	569,400	569,400
Other Project Cost						
Facility Operations – payments to vendors [a]	1,300	6,800	8,200	0	457,500	473,800
Facility Support – M&O support/Other [b]	1,900	1,500	1,000	1,200	66,600	72,200
Total, Other Project Cost . .	3,200	8,300	9,200	1,200	524,100	546,000
Total Project Cost	3,200	8,300	9,200	1,200	1,093,500	1,115,400

[a] Of the total, $16.3 million will be paid for preliminary facility and process design activities, licensing and permitting (Phase 1 costs) funded from EM base operating program. Outyear payment to vendors include $434.8 million for facility operations and $227.7 million for D&D.

[b] Facility infrastructure support (e.g. utilities, fire protection, etc.).

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Given the nature of the privatization contract these operating costs are shown as part of the Total Project Cost.		
Total related annual funding	N/A	N/A

97-PVT-3, Transuranic Waste Treatment; Oak Ridge, Tennessee

Significant Changes

- A contract for the treatment of transuranic waste was awarded to Foster Wheeler Environmental Corporation in August 1998 through a competitive procurement. This contract was awarded for an amount significantly less than the original Management and Operating Contractor estimate which was the basis of the FY 1999 Budget Request.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1998 Budget Request (*A-E and technical design only*)	N/A	N/A	3Q 2000	3Q 2002	142,000	455,300
FY 1999 Budget Request (*Preliminary Estimate*)	N/A	N/A	3Q 2000	3Q 2002	127,000	369,439
FY 2000 Budget Request (*Current Estimate*)	N/A	N/A	4Q 2001	4Q 2003	77,000	211,588

2. Financial Schedule

(Dollars in Thousands)

Fiscal Year	Appropriations [a]	Obligations [b]	Costs
Design [c]			
1997			
Construction			
1997	65,000 [d]	0	0
1998	0	3,964	0
1999	0	0	0
2000	12,000	0	0
2001	0	73,036	0
2002	0	0	0
2003	0	0	58,000
2004	0	0	19,000
Outyears [e]	0	0	0

3. Project Description, Justification and Scope

The Department of Energy will transfer remote handled transuranic sludge from 13 different tanks at the Oak Ridge National Laboratory into eight storage tanks which contain the majority of the waste sludge and are located in the Melton Valley area. In addition to sludge, the transuranic project includes approximately 550 cubic meters of remote-handled solids and approximately 1,000 cubic meters of contact handled solids. Foster Wheeler has been contracted with to remove the sludge from the tanks and treat the sludge, solids and supernate in an on-site facility to meet disposal requirements, thereby satisfying the State of Tennessee Commissioner's Order requirements. All transuranic solids would be delivered to the private vendor for treatment, followed by disposal at Waste Isolation Pilot Plant.

The Department has approximately 900 cubic meters of remote handled transuranic sludge and approximately 1,600 cubic meters of alpha low-level supernate stored in various tanks at the Oak Ridge National Laboratory. Three different treatment options have been analyzed, which include procurement

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[a] For multi-year funded projects, appropriation is needed a year ahead of contract commitments to preclude anti-deficiencies.

[b] Includes current contractor investment plus funds to maintain current project schedules (including allowances for items such as long-lead procurements).

[c] Design is funded with Defense operating funds. Payments to vendor for design and permitting were funded under the Defense Environmental Restoration and Waste Management appropriation.

[d] Reflects appropriation in FY 1997 from Defense Environmental Restoration and Waste Management Appropriation, Fixed Asset Acquisition Account.

[e] Project will require decontamination and decommissioning between 2006 and 2009 which will be funded from the Defense Environmental Restoration and Waste Management Appropriation.

of waste treatment service in a privately owned facility on leased land, a new Waste Handling and Packaging Plant for treatment services by the existing Management and Operating contractor, and conversion of an existing Oak Ridge National Laboratory Hot-cell facility for treatment by the existing Management and Operating contractor. The privatization option was chosen to reduce cost and improve schedule. Obtaining a privatization contract through competitive procurement is expected to lead to cost savings/avoidance of $400.0 million (58 percent) compared to the cost estimate for the traditional Management and Operating contract approach. Additionally, the private sector schedule is expected to save five years over the Management and Operating based estimate.

Originally, the treatment of the Transuranic sludges and Transuranic solids were submitted as separate projects (in FY 1997 and FY 1998 respectively). Greater cost efficiencies were obtained by combining these two projects into a single procurement.

A four phase contract for the treatment of the waste, through a competitive procurement, was awarded to Foster Wheeler Environmental Corporation in August 1998. Phase I will be a fixed-price procurement for the permitting and licensing of the treatment facility. The Department will isolate and fence the Melton Valley Storage Tank area and roadway access from state highway 95 and lease this area to the contractor. During Phase I, the contractor will perform all design and engineering needed to obtain applicable permits and licenses for their treatment process. Phase I will be fully funded by the contractor. The contractor will be reimbursed by DOE after satisfactorily completing Phase I scope of work. The Phase I costs for licensing and permitting will be funded from the EM base operating program. Upon completion of Phase I and National Environmental Policy Act (NEPA) anaylsis, Phase II will proceed with construction of the treatment system and any pre-testing required by the disposal facilities or the regulatory agencies. Phase II will be fully funded by the contractor. Phase III will be performed on a fixed unit price basis and will consist of removal of the waste sludge from the tanks and treatment of sludge and solid waste in the licensed/permitted facility. The contractor will recover their Phase II costs during Phase III treatment. Phase IV will consist of decontamination and decommissioning. A portion of the contractor's payment will be retained by DOE during the Phase III, to be paid when Decontamination & Decommissioning is complete.

The DOE will provide area fencing, roadway upgrades and NEPA documentation. Contract was awarded in August 1998 with licensing and permitting completion by FY 2001. Construction is scheduled for completion and treatment will begin in 2003. Project close out is scheduled for FY 2007 with Decontamination & Decommissioning completed in FY 2009.

It is anticipated that the contractor will obtain permits from the Environmental Protection Agency and Tennessee Department of Environment and Conservation. The project must be completed and executed under the Tennessee Department of Environment and Conservation Commissioner's Order.

The FY 1997 funding level of $65.0 million was sufficient for the purpose of initial obligations for the contract to the vendor. The additional amount of $12.0 million, is required for the purpose of completing the full obligation on the contract. These funds will also cover the remote possibility of termination of the contract. They will eventually be used to reimburse capital expenditures after services commence.

Future budget requests for $116.6 million will be made within the Defense Environmental Restoration and Waste Management Appropriation, for the purpose of making payments to the vendor for the contractually required service or product. This estimate reflects a change from that cited in the FY 1999

Congressional Request due to combining the project workscope originally proposed in FY 1998 with the privatization project appropriated in FY 1997 under the Fixed Assets Acquisition Account resulting in a cost savings. An additional $18.0 million from the Defense Environmental Restoration and Waste Management appropriation will provide for support of the privatization effort.

4. Details of Cost Estimate

(Dollars in Thousands)

	Current Estimate	Previous Estimate
The data required for this section equating to the Total Estimated Cost is not available at this time. The Request For Proposal for this project is based on total project requirements rather than just the construction portion. The Department will ensure the information is available in the future.	N/A	N/A

5. Method of Performance

Two draft Invitation for Bids were released for potential contractor review and comment. Applicable comments were incorporated into the final Request for Proposal which was released in June 1997, and awarded in August 1998.

The construction portion of the project will start after all applicable permits and licenses are obtained, but not later than 2.5 years after the start of the contract. The contractor will have up to two years to construct the facility, but shall complete construction no later than December 31, 2002.

The Department will lease the land and Melton Valley storage tanks to the private contractor at the beginning of Phase II. The contractor will recoup the capital cost of the treatment facility as waste is treated and ownership of the facility will revert to the Department of Energy.

The transuranic treatment facility will be considered as temporary. The contractor will dispose of all secondary waste generated during their project and remove all contaminated material that may have spilled during the project. The contractor will return the site to its previous condition.

6. Schedule of Project Funding

(Dollars in Thousands)

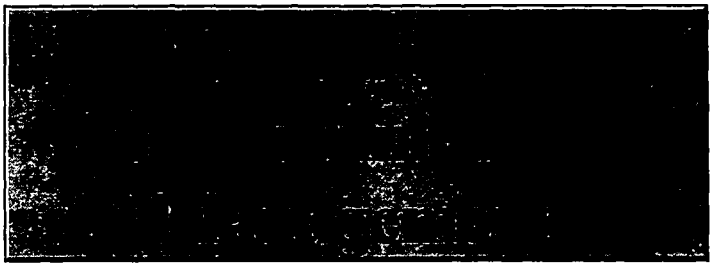
	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Payments to Vendors ..	0	0	0	0	77,000	77,000
Other Project Cost						
Facility Operations – payments to vendors ..	0	0	15,563 [a]	8,380	92,670	116,613
Facility Support – M&O support/Other	0	3,900	3,299	3,000	7,776	17,975
Total, Other Project Cost ...	0	3,900	18,862	11,380	100,446	134,588
Total Project Cost	0	3,900	18,862	11,380	177,446	211,588

7. Related Annual Funding Requirements

(FY 2000 dollars in thousands)

	Current Estimate	Previous Estimate
Given the nature of the privatization contract, these operating costs are shown in the Total Project Cost.		
Total related annual funding	0	0

[a] Payment to vendor for facility design and permitting.



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Non-Defense Environmental Management

Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction and acquisition of plant and capital equipment and other expenses necessary for non-defense environmental management activities in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition construction or expansion, [$431,200,000] *$330,934,000*, to remain available until expended. *(Energy and Water Development Appropriations Act, 1999.)*

Explanation of Change

None

Non-Defense Environmental Management

Program Mission

The Environmental Management (EM) program is responsible for managing and addressing the environmental legacy resulting from the production of nuclear weapons and nuclear energy research. The nuclear energy research and development efforts of the Department of Energy and its predecessors generated waste, pollution, and contamination which pose unique problems, including unprecedented volumes of contaminated soil and water, radiological hazards from special nuclear material, and a vast number of contaminated structures. Much of this infrastructure, waste, and contamination still exists and is largely maintained, decommissioned; managed, and remediated by the EM program, which is sometimes referred to as the "cleanup program." EM's responsibilities include facilities and areas at 113 geographic sites (excluding the 21 sites in the Formerly Utilized Sites Remedial Action Project transferred to the U.S. Army Corps of Engineers). These sites are located in 30 states and one territory and occupy an area equal to that of Rhode Island and Delaware combined -- or about 2 million acres.

The FY 2000 request for the Non-Defense Environmental Management appropriation is $330,934,000, a decrease of about $100 million from the FY 1999 appropriation. EM manages and cleans up sites used for civilian, energy research, and non-defense related programs under this appropriation Pursuant to the FY 1998 House Energy and Water Development Report (House Report 105-190), no technical assistance contracts, nor support service contracts are funded in the Non-Defense Environmental Management appropriation.

Program Goal

The EM program has established a goal of cleaning up as many of its contaminated sites as possible by 2006 in a safe and cost-effective manner. By working towards this goal, EM can reduce the hazards presently facing its workforce and the public, and reduce the financial burden on the taxpayer. The FY 2000 budget request continues to reflect the program's emphasis on site closure and project completion--in other words, finishing our work as quickly as possible.

Program Objectives

- Continue to address the most serious environmental risks across the DOE complex and ensure that facilities and activities pose no undue risks to the public and worker safety and health.
- Continue to be substantially in compliance with applicable environmental and other requirements and meet compliance milestones.
- Continue surveillance and maintenance of facilities.

Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

- EM achieved a major milestone in FY 1998 which significantly contributes to the overall EM cleanup mission. In FY 1998, all Uranium Mill Tailings Remedial Action Surface Project remediation activities were completed. This brings to a close one of the Department's longest running and major environmental cleanup programs, which was authorized by Congress in 1978 and cost approximately $1 5 billion, including $100 million provided by the states involved Under the Uranium Mill Tailings Remedial Action Surface Project, the Department completed remedial actions at 22 of the 24 originally designated sites, with two sites being delisted and their responsibility transferred to the state of North Dakota. The Project involved efforts with 11 States, 2 Indian tribes, and 23 communities. Cleanup was performed at over 5,300 vicinity properties located near the 22 designated Uranium Mill Tailings Remedial Action sites, and over 40 million cubic yards of material were remediated and nineteen long-term disposal cells were constructed. At most of these sites, groundwater contamination remains (and is being addressed by the Uranium Mill Tailings Remedial Action Groundwater Project) and the disposal cells must be permanently monitored and maintained. The completion of the Uranium Mill Tailings Remedial Action Surface Project marks a significant milestone in the Department's efforts to remediate the environmental legacy from the production of nuclear weapons. Just as mining and milling of uranium was the first step towards the production of nuclear weapons, the completion of the Uranium Mill Tailings Remedial Action Surface Project represents the first step towards "closing the circle" of the environmental legacy from nuclear weapons production
- The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component of the effort to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Onginal Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Non-Defense Environmental Management					
Site Closure	270,241	254,344	-5,859 [a]	248,485	211,146
Site/Project Completion	111,687	102,948	-1,623 [a]	101,325	100,866
Post 2006 Completion	81,508	83,908	3,616 [b]	87,524	18,922
Subtotal, Non-Defense	463,436	441,200	-3,866	437,334	330,934
Use of Prior Year Balances (to satisfy Congressional offset)	0	-10,000	9,400	-600	0
Use of Prior Year Balances (to finance FY 1999 activities)	n/a	n/a	-5,534	-5,534	n/a
FFTF (transferred to NE in FY99)	41,727	0	0	0	0
Total, Non-Defense	505,163	431,200	0	431,200	330,934

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act (1977)"
Public Law 103-62, "Government Performance and Results Act of 1993"
Public Law 105-245, "The Energy and Water Development Appropriations Act, Fiscal Year 1999"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office					
Grand Junction Office	39,573	41,413	30,500	-10,913	-26.4%
Los Alamos National Laboratory	975	1,611	6,000	4,389	272.4%
Lovelace Biomedical & Environmental Research Institute	789	478	481	3	0.6%
Uranium Mill Tailings Remedial Action Groundwater Project	5,559	5,902	13,000	7,098	120.3%
Uranium Mill Tailings Remedial Action Surface Project	35,936	20,782	0	-20,782	-100.0%
Total, Albuquerque Operations Office	82,832	70,186	49,981	-20,205	-28.8%

[a] Reflects the prior year balances offset taken from new budget authority.

[b] Reflects -$1,918,000 for prior year balances offset taken from new budget authority; and +$5,534,000 for FY 1999 activities financed by prior year balances.

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Chicago Operations Office					
Ames Laboratory	260	306	260	-46	-15.0%
Argonne National Laboratory - East	11,768	18,170	19,761	1,591	8.8%
Argonne National Laboratory - West	3,630	1,142	809	-333	-29.2%
Brookhaven National Laboratory	26,137	30,001	29,553	-448	-1.5%
Chicago Operations Office	194	1,101	644	-457	-41.5%
Princeton Plasma Physics Laboratory	3,290	3,343	3,073	-270	-8.1%
Total, Chicago Operations Office	45,279	54,063	54,100	37	0.1%
Idaho Operations Office					
Idaho National Engineering and Environmental Laboratory	7,501	10,027	9,208	-1,138	-11.3%
Oakland Operations Office					
Energy Technology Eng. Center	17,625	16,494	17,398	904	5.5%
General Atomics	4,280	2,030	1,100	-930	-45.8%
General Electric	0	313	500	187	59.7%
Lawrence Berkeley National Laboratory	9,265	10,668	11,098	430	4.0%
Oakland Operations Office	87	0	300	300	>999%
Stanford Linear Accelerator Center	1,006	1,000	1,400	400	40.0%
U.C. Davis/Lab for Energy-Related Health Research	6,802	4,389	3,863	-526	-12.0%
Total, Oakland Operations Office	39,065	34,894	35,659	765	2.2%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	41,519	59,677	0	-59,677	-100.0%
Oak Ridge Operations Office	1,523	1,100	1,105	5	0.5%
Oak Ridge Reservation	15,512	6,901	2,297	-4,604	-66.7%
Oak Ridge Offsite Locations	6,993	3,427	400	-3,027	-88.3%
Weldon Spring Site	66,686	63,500	52,000 [a]	-11,500	-18.1%
Total, Oak Ridge Operations Office	132,233	134,605	55,802	-78,803	-58.5%
Ohio Field Office					
Columbus	7,749	8,532	7,293	-1,239	-14.5%
Miamisburg	992	1,003	1,000	-3	-0.3%
West Valley	113,746	107,353	107,353	0	0.0%
Total, Ohio Field Office	122,487	116,888	115,646	-1,242	-1.1%

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63.5 million. The program will work to identify funding sources for this important activity.

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Richland Operations Office					
Hanford Site	19,053	1,863	1,418	-445	-23.9%
Savannah River					
Savannah River Site	4,248	0	0	0	0.0%
Multi-Site Activities	10,738	9,274	9,120	-154	-1.7%
FY 1999 activities financed by prior year bal	n/a	5,534	n/a	n/a	n/a
Subtotal, Non-Defense Environmental Mgmt	463,436	437,334	330,934	-101,185	-23.1%
Use of Prior Year Balances (to satisfy Congressional offset)	0	-600	0	600	-100.0%
Use of Prior Year Balances (to finance FY 1999 activities)	n/a	-5,534	n/a	n/a	n/a
FFTF (transferred to NE in FY 99)	41,727	0	0	0	0.0%
Subtotal, Non-Defense Environmental Mgmt	505,163	431,200	330,934	-100,585	-23.3%

Site Closure

Program Mission

The Non-Defense Site Closure account, includes sites where the Environmental Management program plans to complete its mission by the end of FY 2006. This account includes funding for the West Valley Demonstration Project in New York, the Battelle Columbus Laboratory and the Mound Plant in Ohio, projects under the Grand Junction Office in Colorado, Uranium Mill Tailings Remedial Action Surface and Ground Water Projects at various locations, and the Weldon Spring Site in Missouri.

Program Goal

Accelerating cleanup and project completion is a central goal of the Environmental Management program. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths To Closure* document, whereby all Environmental Management sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules. For those sites in the Site Closure account, the goal of the Environmental Management program is to complete the cleanup mission by FY 2006, after which no further Departmental mission is envisioned, except for limited long-term surveillance and maintenance, and the sites will be available for some alternative use.

Program Objectives

- Continue to accelerate cleanup efforts at sites and realize substantial savings by the resulting reduction in long-term program costs and ongoing support costs.
- Where possible, once the cleanup mission has been accomplished, make sites available to communities for other uses.

Performance Measures

Environmental Management has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that the Environmental Management has developed as a key component of the effort to accelerate cleanup and reduce costs. All Environmental Management activities have been organized into projects, which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, the Environmental Management sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow

Funding Profile

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	81,068	68,097	43,500	-24,597	-36.1%
Oak Ridge Operations Office	66,686	63,500	52,000 [a]	-11,500	-18.1%
Ohio Field Office	122,487	116,888	115,646	-1,242	-1.1%
Total, Site Closure, Non-Defense	270,241	248,485	211,146	-37,339	-15.0%

Public Law Authorization:

Public Law 95-91, Department of Energy Organization Act (1977)

Public Law 95-604, Uranium Mill Tailings Radiation Control Act (1978)

Public Law 100-616, Uranium Mill Tailings Remedial Action Amendments Act of 1988

Public Law 105-245, The Energy and Water Development Appropriations Act, Fiscal Year 1999

Public Law 96-368, West Valley Demonstration Project Act of 1980.

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63,500,000. The program will work to identify funding sources for this important activity.

Albuquerque

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management Site Closure Program, managed through the Albuquerque Operations Office, is to complete the cleanup of all release sites assigned to the Program and to continue several longer-term programs as required. Virtually all of this work from FY 2000 on will be performed by the Grand Junction Office in Colorado. The release sites include the 57 acre Grand Junction Office facility, the Monticello Millsite in Utah, and the 22 inactive uranium millsites that were designated by Congress for cleanup by the Uranium Mill Tailings Remedial Action Surface and Ground Water Projects program. Continuing missions include the Long-Term Surveillance and Maintenance Program and the Uranium Lease Management Program. The current mission also includes the facility management of the Grand Junction Office site including waste management at the site It is no longer cost-effective to operate and maintain the entire 57 acre Grand Junction Office facility for the planned mission. The Department is working with the Grand Junction community to identify options for making all or part of the facility available for other productive uses, while continuing the Grand Junction Office mission in Grand Junction.

Program Goal

The Albuquerque Operations Office goal is to complete cleanup of all geographic sites under this program by FY 2006, with the exception of ground water cleanup at several of the Uranium Mill Tailings Remedial Action sites. A major milestone is the completion of the Uranium Mill Tailings Remedial Action Surface Project remedial actions in FY 1998 and closeout of the Project in FY 1999. At the request of the State of North Dakota, the designations of the two North Dakota Uranium Mill Tailings Remedial Action sites were revoked in FY 1998, reducing the number of Uranium Mill Tailings Remedial Action sites from 24 to 22. The Long-Term Surveillance and Maintenance Program is responsible for the long-term custody and care of more than 50 disposal sites and will continue indefinitely. The Uranium Lease Program will continue until active leases expire and reclamation of mine sites is completed (estimated to be by FY 2010). The Uranium Mill Tailings Remedial Action Ground Water Project is scheduled to be completed by 2012, at which time sites that require longer-term monitoring or maintenance will be transferred to the Long-Term Surveillance and Maintenance Program. The goal for the Grand Junction Office site is to complete the site cleanup and to transfer the facility to a community group(s) for alternative uses by FY 2003 and to continue the Department of Energy mission at other facilities in Grand Junction or at a small portion of the facility using a lease-back arrangement.

Program Objectives

The Uranium Mill Tailings Remedial Action Ground Water Program objective is to eliminate or reduce to acceptable levels the potential health and environmental consequences of milling activities on ground water at inactive uranium processing sites under P.L. 95-604. The Uranium Mill Tailings Remedial Action Ground Water Program uses a risk-based decision-making process that ensures consistency in choosing site-specific active, passive, or no-remediation strategies to comply with ground water standards. By conducting program compliance in this cost-effective and timely manner, active restoration techniques should be limited to only three sites where the level of risk is unacceptable

The Grand Junction Office will continue to decommission buildings at its site under the Grand Junction Office Remedial Action Project, as well as complete significant remediation at the Monticello, Utah mill and vicinity property sites. The approach of preparing the Grand Junction Office site disposition for re-use and cleaning up the Monticello sites, thereby reducing the overall program workload, will support the future downsized mission of the Grand Junction Office.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

Uranium Mill Tailings Remedial Action Surface Project

- Revoked designations of the Belfield and Bowman, North Dakota, Uranium Mill Tailings Remedial Action Sites. This action removed both sites from the Uranium Mill Tailings Remedial Action Surface and Ground Water Projects program.
- Completed Remedial Actions at the final 2 Uranium Mill Tailings Remedial Action sites: Naturita and Maybell, both in Colorado (FY 1998).
- Complete project closure with the licensing and transfer of the final sites to the Long-Term Surveillance and Maintenance Program and the termination of the prime contracts (FY 1999).

Uranium Mill Tailings Remedial Action Ground Water Project

- Completed five release sites: Ambrosia Lake, New Mexico; Falls City, Texas; Canonsburg, Pennsylvania; Salt Lake City, Utah, and Riverton, Wyoming (FY 1998).
- Completed one interim action, provision of an alternate water supply, in cooperation with the Indian Health Service, at the Riverton, Wyoming, site that is adjacent to the Wind River Reservation (shared by Arapaho Nation and Shoshone Tribe) (FY 1998).
- Complete four release sites: Mexican Hat, Utah; Rifle, Colorado (two sites); and Grand Junction, Colorado (FY 1999).

- Start active ground water restoration at two sites. Tuba City, Arizona and Monument Valley, Arizona (FY 1999).
- Complete alternate water supply at Monument Valley, Arizona, and complete field investigation at Shiprock, New Mexico (FY 1999).

Monticello Projects

- Hauled and placed 1.1 million cubic yards of mill tailings to the repository; completed cleanup of vicinity properties; completed soil remediation in the lower Montezuma Creek Canyon, and initiated interim remedial action for ground water (FY 1998).
- Haul and place final 0.6 million cubic yards of mill tailings to repository; complete cleanup of peripheral and vicinity properties, complete cleanup of the Montezuma Creek Canyon and interim remedial action for ground water (FY 1999)

Grand Junction Office All Other Projects

- Paid cost of site mill tailings disposal at Cheney; conducted site environmental monitoring; provided for facility management support; initiated reimbursement of former site contractor for contract close-out; and provided support for Long-Term Surveillance and Maintenance for 25 sites and Uranium Leasing Program activities for 43 sites (FY 1998)
- Conduct site environmental monitoring; decommission three site buildings; provide for facility management support, reimburse former site contractor for contract close-out, provide support for long-term surveillance and maintenance for up to 30 sites and Uranium Leasing Program activities for 43 sites; and re-start reclamation of disturbed uranium leasing tracts where no lease holder is liable (FY 1999).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AL-020 / Surface Remedial Action Project	35,936	20,782	0	-20,782	-100.0%
AL-022 / Monticello Projects	25,558	34,250	22,000	-12,250	-35.8%
AL-023 / Uranium Mill Tailings Remedial Action Ground Water	5,559	5,902	13,000	7,098	120.3%
AL-024 / Grand Junction Office All Other Projects	14,015	7,163	8,500	1,337	18.7%
Total, Albuquerque	81,068	68,097	43,500	-24,597	-36.1%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Uranium Mill Tailings Remedial Action Surface	35,936	20,782	0	-20,782	-100.0%
Monticello	25,558	34,250	22,000	-12,250	-35.8%
Uranium Mill Tailings Remedial Action Ground water	5,559	5,902	13,000	7,098	120.3%
Grand Junction Office	14,015	7,163	8,500	1,337	18.7%
Total, Albuquerque	81,068	68,097	43,500	-24,597	-36.1%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	7.0	4.0	0.0
Cleanups	13.0	5.0	5.0
Facility Decommissioning			
Assessments	0.0	0.0	10.0
Cleanups	0.0	3.0	11.0

Site Description

Grand Junction Office

The Grand Junction Office is located immediately south of the City of Grand Junction, Colorado, on a 57 acre site adjacent to the Gunnison River. The Grand Junction Office supports environmental management activities in the areas of site characterization, project integration and coordination, remedial design, remedial action, independent verification, decontamination and dismantlement, and long-term surveillance and maintenance. Current Grand Junction Office project assignments include the Monticello millsite and vicinity properties cleanup, the Grand Junction Office Remedial Action Project, the Long-Term Surveillance and Maintenance Program, the Uranium Leasing Program, the Grand Junction Office Waste Management Program, the Grand Junction Office Landlord Program, and the Uranium Mill Tailings Remedial Action Ground Water Project. The Grand Junction Office Program is comprised of 22 release sites and 44 facilities, and the Uranium Mill Tailings Remedial Action Ground Water Project consists of 22 release sites.

The Grand Junction Office also performs the ground water cleanup (Pinellas) and Maxey Flats Field Management projects (both contained in Site/Project Completion Defense) and other projects in support of the Albuquerque Operations Office and Headquarters.

Monticello Projects

Environmental cleanup efforts at and around Monticello, Utah, include remedial action on a 110-acre inactive Government-owned uranium/vanadium mill processing site and the adjacent private and the Department of Energy owned peripheral properties, assessment and remediation of surface and ground water contamination near Monticello, and remediation of more than 400 private properties (referred to as "Vicinity Properties") which have been contaminated by mill tailings from the Monticello millsite.

The Monticello Projects are high visibility projects with the Environmental Protection Agency and State of Utah. The Monticello Vicinity Properties Site and the Monticello Mill Tailings Site, both located in Monticello, Utah, are on the National Priorities List and are being remediated in accordance with the Comprehensive Environmental Response, Compensation and Liability Act. A Federal Facility Agreement among the Department of Energy, the Environmental Protection Agency, and the State establishes the Department of Energy as the responsible party for remedial action and the Environmental Protection Agency as the lead agency with the ultimate responsibility and authority. The Environmental Protection Agency shares its decision-making authority with the State of Utah.

Vanadium and uranium were processed at the Monticello Millsite in the late 1940s to the late 1950s. Approximately 1.7 million cubic yards of mill tailings remained on the millsite and another 0.7 million cubic yards had been relocated off-site by wind and water erosion, or through use of the material in construction in the City of Monticello and adjacent vicinity and peripheral properties The sites were listed on the National Priority List because of significant risk to human health associated with the tailings and tailings-contaminated soils. Radon emitted from the tailings piles on the millsite exceeds the Environmental Protection Agency's standards for the off-site exposure. The tailings deposited in the community pose unacceptable risk of radon accumulation in structures. The tailings piles are in direct contact with an alluvial ground-water flow system which discharges to Montezuma Creek. Contaminant levels in the creek exceed State of Utah standards for surface water. The ground water has been contaminated by the tailings. While the ground water is not currently used for domestic consumption, there are no institutional controls to prevent its use, and human consumption would cause unacceptable health risks. A Feasibility Study is in preparation to support selection of a preferred remedy for restoration of surface and ground water quality. Tailings deposited in sediments along Montezuma Creek will be remediated to control risk to humans and the environment to within acceptable levels

The Monticello Mill Tailings Site consists of three operable units Operable Unit I is remediation of the 110-acre millsite requiring removal of tailings and placement into an on-site repository. Removal of 1,700,000 cubic yards (total at completion) of tailings-contaminated soil from the millsite and placement into the repository is expected. The repository has been excavated and lined with a Resource Conservation and Recovery Act-equivalent liner system. Operable Unit II is remediation of 330 acres of peripheral properties. Removal of about 550,000 cubic yards of tailings-contaminated soils from these properties is expected. Operable Unit III is remediation of contaminated ground water and surface water at the millsite and downstream from the millsite. Also included in Operable Unit III is remediation of contaminated sediments deposited along approximately three miles of Montezuma Creek. All contaminated material has been removed. To date, the repository has received 2,000,000 cubic yards of tailings-contaminated soil.

The Monticello Vicinity Properties Site entails the remediation of 424 properties contaminated with tailings and/or uranium ore. To date, nearly all properties have been remediated. Removal of 130,000 cubic yards (total at completion) of tailings-contaminated soil from these properties is expected.

Uranium Mill Tailings Remedial Action Surface

The Uranium Mill Tailings Remedial Action Surface Project was created as a result of Public Law 95-04, "The Uranium Mill Tailings Radiation Control Act of 1978," which authorized the Department to conduct a mill tailings stabilization and control program at inactive uranium ore processing sites that were contaminated with tailings and other byproducts of uranium milling operations. The program includes approximately 5,300 associated vicinity properties which became contaminated by windblown waste or debris or contaminated materials used in construction or landscaping. Each mill tailings processing site is comprised of one release site. The Uranium Mill Tailings Remedial Action Surface Project activity supports efforts in eleven states (Arizona, Colorado, Idaho, New Mexico, North Dakota, South Dakota, Oregon, Pennsylvania, Texas, Utah, and Wyoming) and with two Indian tribes. The Uranium Mill Tailings Remedial Action Surface Project is a cost-shared project, with the Federal Government paying 90 percent of the remedial action cost and the States paying ten percent. When the sites are on Indian lands, the Department pays the entire cost of the remedial action. Remedial action had been completed for 22 of the 24 former uranium ore processing sites as of the end of FY 1997. Remedial action at two sites (Maybell and Naturita, Colorado) was completed in FY 1998. At the request of the State of North Dakota, the designations of the two North Dakota sites were revoked in 1998, reducing the total number of sites to 22. The remaining activities to complete project closeout of all contracts and the licensing of the remaining sites will be accomplished in FY 1999.

The Uranium Mill Tailings Remedial Action Amendments Act of 1988 (P.L. 100-616) extended the Department's authority to conduct remedial actions at the designated sites through the end of FY 1994, and that authority was subsequently extended to the end of FY 1996. Public Law 104-259, signed by President Clinton on October 9, 1996, provided a final extension through FY 1998, to allow orderly termination of the Surface Project. It also authorizes the Cheney disposal site in Grand Junction, Colorado, to remain open for up to 25 years to accept vicinity property or ground water wastes from Title I sites and vicinity property material from the Monticello, Utah Project after the Monticello cell closes.

Uranium Mill Tailings Remedial Action Ground Water

The Uranium Mill Tailings Remedial Action Ground Water Project will carry out additional characterization and compliance efforts not covered by the Uranium Mill Tailings Remedial Action Surface Project, at 22 designated uranium mill tailings sites. The project was initially authorized by Public Law 95-604. Each mill tailings site is a ground water release site. Public Law 100-616 authorized ground water compliance activities for an unlimited period of time. Where active remedial action is required, the Department will pay 90 percent of the costs; the States will pay ten percent. The Department is responsible for the entire cost of the remedial action for sites on Indian lands. Key activities in FY 1999 are to initiate active ground water compliance activities at the Tuba City and Monument Valley, Arizona, sites and to complete four release sites (Mexican Hat, Utah; two in Rifle, Colorado; and Grand Junction); complete one alternate water supply at Monument Valley; initiate a field investigation at Naturita, Colorado; and complete a field investigation at Shiprock, New Mexico.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
AL-020 / Uranium Mill Tailings Remedial Action - Surface Remedial Action Project			
This project stabilized and controlled uranium mill tailings from 22 inactive processing sites. The project is closed out in FY 1999. All funding in FY 1999 is for closeout.			
■ No activity.			
AL-020	35,936	20,782	0

Metrics			
Remedial Action/Release Sites			
Cleanups	2.0	0.0	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
AL-022 / Monticello Projects			
This project will provide remediation and restoration of the mill site, cleanup of vicinity and peripheral properties, and surface and ground water cleanup.			
■ Complete cleanup of the mill site; complete the disposal cell cover, and initiate mill site reclamation, continue cleanup of the Montezuma Creek and interim remedial action for ground water. These activities fully support the Grand Junction Office mission in the timely cleanup and delisting of the Monticello Mill and Vicinity Properties National Priority List sites.			
AL-022	25,558	34,250	22,000
Metrics			
Remedial Action/Release Sites			
Cleanups	6.0	1.0	5.0

AL-023 / Uranium Mill Tailings Remedial Action Ground Water

The purpose of the Project is to achieve compliance with the Environmental Protection Agency's ground water standards at the 22 sites remediated by the Uranium Mill Tailings Remedial Action Surface Project. Contamination at the sites occurred prior to the Department of Energy cleanup of the tailings, and in most cases has migrated beyond the original mill site, and in many cases is underneath adjacent private property.

The Environmental Protection Agency standards for Uranium Mill Tailings Remedial Action Title I sites provides the Department of Energy with flexibility to achieve compliance through a range of strategies that recognize different levels of risk Characterization and baseline risk assessments have been conducted at all of the sites, and no one is at immediate risk from using contaminated ground water. At four sites, where there was a potential for near-term human exposure, alternate water supplies are being provided as interim actions. At this time it appears three sites will require active cleanup, nine sites will achieve compliance through natural attenuation, and the remaining ten sites will employ Supplemental Standards or Alternate Concentration Limits.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
A Uranium Mill Tailings Remedial Action Ground Water Programmatic Environmental Impact Statement was approved in May 1997, which lays out the overall Project approach for selecting compliance strategies. Site-specific Environmental Assessments are prepared that tier off of the Programmatic Environmental Impact Statement. These Environmental Assessments are usually 25 pages or less and are prepared to the extent possible by the Department of Energy staff, which minimizes costs. ■ Conduct Phase I remediation strategies at 2 sites: Tuba City and Monument Valley, Arizona; complete Work Plan at Shiprock, New Mexico. ■ Complete field investigations/initiate Work Plans at 4 sites: Durango, Gunnison, and Slick Rock (two sites), Colorado. ■ Complete National Environmental Policy Act documentation at Rifle, Colorado and Shiprock, New Mexico. ■ Perform monitoring at eight sites, and maintain cooperative agreements and Nuclear Regulatory Commission support. ■ Initiate remedial action at Shiprock, New Mexico; and conduct characterization at other sites in the Project. By the end of FY 2000, the Project plans to have completed 11 release sites and have active cleanup underway at the three sites projected to require active remediation.			
AL-023	5,559	5,902	13,000

Metrics			
Remedial Action/Release Sites			
Assessments	7.0	4.0	0.0
Cleanups	5.0	4.0	0.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
AL-024 / Grand Junction Office All Other Projects			
Provides for Grand Junction Office site cleanup, environmental monitoring activities, facility management, administration of uranium leases, Long-Term Surveillance and Maintenance, and waste management and minimization activities.			
■ Conduct site environmental monitoring; complete ten assessments and 13 building decommissionings at the site, provide for facility management support, reimburse former site contractor for contract close-out, conduct Long-Term Surveillance and Maintenance at up to 30 sites; and support Uranium Leasing Program activities for 43 sites			
AL-024	14,015	7,163	8,500
Metrics			
Facility Decommissioning			
Assessments	0.0	0.0	10.0
Cleanups	0.0	3.0	11.0
Total, Albuquerque	81,068	68,097	43,500

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
AL-020 / Uranium Mill Tailings Remedial Action - Surface Remedial Action Project	
■ Reduction due to completion of remediation in FY 1998 and closure of project in FY 1999.	-20,782
AL-022 / Monticello Projects	
■ The requested funding level is a reduction from the peak FY 1999 funding and reflects the nearing of completion of work at the mill site project.	-12,250
AL-023 / Uranium Mill Tailings Remedial Action Ground Water	
■ The increase is needed because it will be the first year the active cleanups will be under way at all three active remediation sites. The active cleanups will be the most cost intensive part of the Project. The cleanups are sensitive in that all three are on Native American lands, and the cleanup of ground water has cultural significance to the tribes as well as health and safety benefits. Work at the active compliance strategy sites will increase significantly and additional field investigation work will commence.	7,098
AL-024 / Grand Junction Office All Other Projects	
■ The requested reduction in Monticello Projects (AL-022) allows a marginal increase in funding for Grand Junction Office All Other Projects. This increase principally funds Long-Term Surveillance and Maintenance in the transfer, administration, monitoring, and maintenance of completed Title I, Title II, and other sites as they become the responsibility of the program.	1,337
Total Funding Change, Albuquerque	-24,597

Oak Ridge

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense, Environmental Management Site Closure program at the Oak Ridge Operations Office is to direct and manage about one million cubic yards of waste at the 226 acre Weldon Spring Site Remedial Action Project in Missouri, which includes an abandoned decommissioned uranium processing plant, a contaminated quarry used for waste disposal, as well as numerous vicinity properties that were contaminated during processing operations.

Program Goal

The goal of this program is to use an accelerated remediation strategy to complete the environmental restoration and permanent on-site disposal of waste at the Weldon Spring Site as soon as possible before FY 2006. This will enable the early completion of restoration work to reduce health risks and free up funding to accelerate remediation goals at other Oak Ridge sites The post remediation activity will be long-term surveillance and maintenance, with the restored land released for unrestricted use.

Program Objectives

The objective is to place all non-releasable contaminated material (soil, debris, pit waste) in the on-site disposal facility for long-term, permanent disposal. Raffinate pit waste will be treated in the Chemical Stabilization/Solidification Facility utilizing state-of-the-art grout technology and placed in the disposal facility. Quarry waste currently in temporary storage will be placed in the disposal facility. Restricted use areas, including the disposal facility, will be placed under long-term surveillance and maintenance until restrictions are no longer needed. The long-term objective for restored land will be to return it to interested local stakeholders for unrestricted use and potential economic development. A stewardship plan in development will determine the appropriate, specific use of unrestricted land.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

In FY 1998, the on-site disposal facility Phase I construction was completed and placement of waste was initiated. By the end of FY 1998 640,000 cubic yards of waste were placed in the disposal facility. The Chemical Stabilization/Solidification facility was constructed, operationally tested, and waste treatment of the raffinate pit waste was begun, and 140,000 cubic yards of grout were placed in the disposal facility. Remediation of Army, Missouri Department of Conservation and the Southeast Drainage vicinity properties was completed, and the design of the raffinate pits restoration was begun. The Quarry Residuals Operable Unit Record of Decision was completed and delivered to the Environmental Protection Agency for approval.

In FY 1999, treatment of raffinate pit waste in the Chemical Stabilization/Solidification Facility and placement in the disposal facility will be completed, with the last 80,000 cubic yards of grouted waste placed. The majority of waste placement (equipment, soils, debris) in the disposal facility will be completed for a total of 630,000 cubic yards placed in FY 1999. The restoration design of the quarry and the main chemical plant site will be initiated, and the restoration of the raffinate pits will begin. The Ground Water Operable Unit Record of Decision will be completed and submitted to the Environmental Protection Agency for approval.

In FY 2000, continue construction of the on-site disposal facility and complete placement of 1.4 million cubic yards of waste. Begin construction of the disposal facility cover, begin quarry area restoration of the borrow area, and initiate chemical plant area restoration and complete raffinate pits restoration.

The FY 2000 request level is sufficient to meet the current project closure schedule of FY 2002.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OR-47201 / Weldon Spring Disposal Facility	49,786	51,200	51,500	300	0.6%
OR-47202 / Weldon Spring Waste Treatment	16,900	12,300	500	-11,800	-95.9%
Total, Oak Ridge	66,686	63,500	52,000 [a]	-11,500	-18.1%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Weldon Spring Site Remedial Action Program (WSSRAP)	66,686	63,500	52,000	-11,500	-18.1%
Total, Oak Ridge	66,686	63,500	52,000 [a]	-11,500	-18.1%

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63,500,000. The program will work to identify funding sources for this important activity.

Metrics Summary

	FY 1998	FY 1999	FY 2000
Facility Decommissioning			
Cleanups	0.0	0.0	1.0
Remedial Action/Release Site			
Assessments	4.0	2.0	0.0
Cleanups	5.0	6.0	1.0

Site Description

The site, located 30 miles west of St. Louis, Missouri, was built by the Department of Army and used for explosives production until 1946. It was converted and operated for the Atomic Energy Commission as a feed materials plant between 1955 and 1966. During operations of the plant, the buildings, equipment, immediate terrain, process sewer system, and drainage easement to the Missouri River became contaminated.

The site consists of two separate facilities, the Weldon Spring Quarry (9 acres) and the Chemical Plant Site (217 acres). The latter includes the raffinate disposal areas (51 acres).

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Weldon Spring Site is managed through a fixed fee integrated contract with fixed price contracts to ensure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. The projects included in this section of the budget have had an independent cost review of the scope or are currently undergoing a cost review, and the funds requested for FY 2000 are appropriate to perform the activities based on the long history of fixed price contracts at the site.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-47201 / Weldon Spring Disposal Facility			
This project provides for environmental restoration of the chemical plant and quarry areas so as to place them in a radiologically/chemically safe condition to protect the public and environment The activities being performed in FY 2000 at the funding level requested are identified for execution in FY 2000 in the approved project baseline and have planned and enforceable milestones as agreed under the Federal Facilities Agreement with the Environmental Protection Agency.			
■ Continue construction and placement of waste in the on-site disposal facility.			
■ Continue the operation of the soil borrow area for the construction of the disposal facility.			
■ Begin quarry restoration.			
■ Continue support facilities demolition and restoration.			
■ Begin chemical plant restoration.			
OR-47201	49,786	51,200	51,500
Metrics			
Facility Decommissioning			
Cleanups	0.0	0.0	1.0
Remedial Action/Release Sites			
Assessments	4.0	2.0	0.0
Cleanups	5.0	6.0	1.0
OR-47202 / Weldon Spring Waste Treatment			
This project provides for the treatment of waste pit sludges and the subsequent environmental restoration of the four raffinate pits at the Chemical Plant Site so as to place them in a radiologically/chemically safe condition to protect the public and environment. The activities being performed in FY 2000 at the funding level requested are identified for execution in FY 2000 in the approved project baseline and have planned and enforceable milestones as agreed under the Federal Facilities Agreement with the Environmental Protection Agency.			
■ Continue raffinate pit restoration.			
OR-47202	16,900	12,300	500

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.	0.0	0.0	0.0
Total, Oak Ridge	66,686	63,500	52,000 [a]

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OR-47201 / Weldon Spring Disposal Facility	
■ No significant changes.	300
OR-47202 / Weldon Spring Waste Treatment	
■ The decrease is due to the completion of waste treatment at the Chemical Stabilization/Solidification facility in early FY 1999.	-11,800
Total Funding Change, Oak Ridge	-11,500 [a]

[a] It is the intent of the Environmental Management Program to fund the Weldon Spring Site Remedial Action Project at a program level of $63,500,000. The program will work to identify funding sources for this important activity.

Ohio

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Site Closure Environmental Management program managed through the Ohio Field Office, is to support cleanup activities at three sites in two states. Sites include: the Columbus Environmental Management Project and the Miamisburg Environmental Management Project in the State of Ohio, and the West Valley Demonstration Project in the State of New York.

Program Goal

The goal for all Ohio Field Office sites is the disposition of real property to the state(s) or communities, resulting in an environmentally-restored end state by 2006. These goals consist of continuing remedial actions to prevent the spread of existing contamination; complete the ongoing remedial action and decontamination activities at Columbus Environmental Management Project sites; cleanups of the buildings and soil at the Miamisburg Environmental Management Project continue the vitrification/solidification of high-level waste tank heels material and the transitioning from maintaining safe storage of spent nuclear fuel to readying the fuel for shipment from the West Valley Site. The estimated completion date for the West Valley Demonstration Project may extend through FY 2015, reflecting several uncertainties discussed below.

Program Objectives

The Miamisburg Environmental Management Project site will be transferred to the City of Miamisburg, the Columbus Environmental Management Project site will be returned to Battelle Laboratories, both for unrestricted use, by the end of 2006. The Columbus Environmental Management Project will decontaminate buildings at Battelle, including transuranic waste processing and associated equipment removal; and remediate solids from external areas at the site.

The West Valley Demonstration Project will be returned to New York State upon completion of the DOE's responsibilities per the West Valley Demonstration Project Act. The estimated completion date for the West Valley Demonstration Project may extend through FY 2015, reflecting the uncertainty related to the schedule for implementing the various alternatives being analyzed for the future Environmental Impact Statement/Record of Decision, which will define the requirements for the out year scope of work, along with other challenges, such as: the ability to ship the high level waste canisters off-site to an interim storage location; ability to ship transuranic waste to an interim storage location; the shipment of spent nuclear fuel to Idaho; completion of the Record of Decision and issuance, by the

Nuclear Regulatory Commission, of decontamination and decommissioning criteria by FY 2000, and resolution of the responsibility issues between DOE and New York State.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level, in the Detailed Program Justification

Significant Accomplishments and Program Shifts

Columbus Environmental Management Project

- Initiated transuranic waste processing (FY 1998).
- Initiated interior decontamination of the West Jefferson building JN-1, including material and equipment removal (FY 1998).
- Provided required core environmental and surveillance and maintenance activities, including facility structural/hazard analysis of major building systems (FY 1998).
- Initiated and continue shipments of low-level waste (FY 1998/FY 1999).
- Initiate the decontamination of two buildings at Battelle Columbus Lab including transuranic waste processing and associated equipment removal; and remediate soils from external areas at the site (FY 2000).

West Valley Demonstration Project

- Completed the primary vitrification campaign on June 10, 1998, ahead of the baseline schedule and below the budgeted cost (FY 1998).
- Safely maintained spent nuclear fuel in storage including procedure development, safety concerns resolution, and annual Safety Analysis Report updates and training programs and operating procedure development for FY 1998 and FY 1999.
- Continue vitrification of tank high-level waste and initiate vitrification of high-level waste tank heels; 81 canisters (FY 1998); 15 canisters (FY 1999).
- Resolve responsibility issues with New York State Energy Research and Development Authority (FY 1999).
- Completed Citizens Task Force input for developing an Environmental Impact Statement preferred alternative (FY 1998); develop preferred alternative for the supplement to the Draft Environmental Impact Statement (FY 1999).
- Continue to store disposal-ready high-level waste canisters (FY 1998/FY 1999).
- Prepared and submitted Spent Nuclear Fuel shipping cask recertification applications to the Nuclear Regulatory Commission (FY 1998).

- Obtain Nuclear Regulatory Commission approval of general decontamination and decommissioning criteria based on Supplement to the Draft Environmental Impact Statement (FY 1999)
- Submitted application to the Nuclear Regulatory Commission for elimination of poison and filler rods for pressurized water reactor fuel (FY 1998).
- Selected backup cask for damaged fuel shipment (FY 1998); issue draft Transportation Plan for review and comment, and select rail transportation route (FY 1999).
- Completed conceptual design of high-level waste canister load-out facility and remote handled waste facility (FY 1998).
- Developed high-level waste tank farm cutoff strategy (FY 1998); develop Vitrification Facility Deactivation Plan (FY 1999).
- Continue vitrification of high-level waste tank heels at West Valley, producing five canisters of solidified high-level waste and complete the transition from maintaining safe storage of West Valley Spent Nuclear Fuel to readying the fuel and systems to initiate shipments to the Idaho National Engineering and Environmental Laboratory in FY 2001 (FY 2000).

Significant Shifts

Outyear work scope has been revised to include on-site or off-site storage options for the West Valley Demonstration Project disposal-ready high-level waste canisters, including isolation of canisters in their current location inside the main plant.

The project cost at the West Valley Demonstration Project is now estimated to range from $2.5 billion to $3.5 billion, to coincide with the estimated completion date (through FY 2015) which is dependent upon the final remediation decision. When the Environmental Impact Statement/Record of Decision and decontamination and decommissioning criteria are published in May 2000, a definitive work scope, cost estimate, and schedule will be developed and validated.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OH-CL-01 / King Avenue Site Decontamination	5,615	1,219	1,500	281	23.1%
OH-CL-02 / West Jefferson Site Decontamination	457	5,750	5,134	-616	-10.7%
OH-CL-03 / Project Management, Site Support & Maintenance	1,677	1,563	659	-904	-57.8%
OH-MB-02-N / Main Hill Tritium (Non-Defense Funded)	992	1,003	1,000	-3	-0.3%
OH-WV-01 / HLW Vitrification and Tank Heel High Activity Waste Processing	53,000	43,800	43,100	-700	-1.6%
OH-WV-02 / Site Transition, Decommissioning & Project Completion	17,185	30,753	29,553	-1,200	-3.9%
OH-WV-03 / Spent Nuclear Fuel	1,561	2,800	4,900	2,100	75.0%
OH-WV-04 / Project Management/Site Support	42,000	30,000	29,800	-200	-0.7%
Total,	122,487	116,888	115,646	-1,242	-1.1%

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Battelle Columbus Laboratories	7,749	8,532	7,293	-1,239	-14.5%
Mound	992	1,003	1,000	-3	-0.3%
West Valley Demonstration Project	113,746	107,353	107,353	0	0.0%
Total, Ohio	122,487	116,888	115,646	-1,242	-1.1%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	0.0	0.0	1.0
Cleanups	0.0	0.0	1.0
Facility Decommissioning			
Assessments	1.0	0.0	0.0
Cleanups	1.0	0.0	1.0
Spent Nuclear Fuel			
Stable Not Disposition Ready (MTHM)	27.0	27.0	27.0
Stable, Not Disposition Ready (m^3)	11.3	11.3	11.3
Transuranic Waste (TRU)			
Storage (m^3)	528.0	532.0	536.0
High-Level Waste			
Storage (m^3)	182.0	82.0	32.0
Treated (m^3)	780.0	100.0	50.0
Canisters Produced	81.0	15.0	5.0
Mixed Low-Level Waste (MLLW)			
Storage (m^3)	149.0	147.0	142.0
Treatment (m^3)	45.0	9.0	12.0
Disposal - DOE Onsite/Commercial (m^3)	1.0	0.0	0.0
Low Level Waste (LLW)			
Storage (m^3)	16,295.0	16,240.0	16,185.0
Disposal - DOE Onsite/ Commercial (m^3)	106.0	425.0	425.0

Site Description

Columbus Environmental Management Project

The Columbus Environmental Management Project is comprised of two geographic sites (West Jefferson and King Avenue) located in and near Columbus, Ohio. Research and development work was performed at its facilities for the Department and its predecessors. The buildings are privately owned by Battelle, and the facility retains an active Nuclear Regulatory Commission license for possession of special nuclear material. Both sites are radioactively-contaminated and funded through both the Defense and Non-Defense appropriation accounts. The Columbus Environmental Management Project consists of 17 facilities and two release sites, of which 13 facilities were completed by the end of FY 1998, including all planned contaminated buildings at the King Avenue site. Independent verification of KA-7 is scheduled for FY 1999. Decontamination activities were initiated in FY 1998 and should be completed by FY 2006 at the West Jefferson site, at which time it will be returned to the private owner.

Miamisburg Environmental Management Project

The Miamisburg Environmental Management Project manages the Mound Plant which is located on 306 acres in Miamisburg, Ohio, ten miles south of Dayton. The Mound Plant was built in the late 1940's to support research and development, testing, and production activities for the Department's defense-nuclear weapons complex and energy research programs This mission continued until 1994, at which time these activities were transferred to other DOE sites. The Mound Plant mission involved production of components containing plutonium-238, polonium-210 and tritium and processed large quantities of various types of high explosives. As a result of these operations, the buildings, soil, and ground water are contaminated with radioactive and hazardous chemicals. The only remaining mission at Mound is the production of plutonium heat sources and Radioisotopic Thermoelectric Generators by the Office of Nuclear Energy primarily for NASA space missions and other customers. The Office of Nuclear Energy is in the process of deciding whether to keep this activity at Mound or to relocate it elsewhere within the DOE complex. The plant has been placed on the Environmental Protection Agency's National Priority List and a Federal Facility Agreement to effect remediation of the site has been negotiated with the Ohio and the United States Environmental Protection Agencies The cleanup of the buildings and soil and eventual disposition of the real property at the Mound Plant will be complete by the year 2005 or earlier. The Mound Plant cleanup is predominantly funded through the Defense Environmental Management appropriation account, but also receives some funding from the Non-Defense appropriation account The only Non-Defense environmental remediation currently being conducted at the Mound Plant is the decontamination of areas within the Semi-Works Cave resulting from radionuclide recovery activities; it is scheduled to be completed by FY 2001.

West Valley Demonstration Project

The West Valley Demonstration Project is located at the Western New York Nuclear Service Center near West Valley, New York. The Center was developed by a private company with government support to process commercial spent nuclear fuel to extract plutonium and uranium and operated from 1966 to 1972.

The West Valley Demonstration Project includes all the activities undertaken to carry out high-level waste solidification, including: (1) preparation of the Western New York Nuclear Service Center's premises and facilities to accommodate the solidification project, including decontamination of existing facilities and equipment; (2) removal of the waste from underground storage tanks; (3) development, design, construction, and operation of systems and necessary supporting facilities for the solidification of waste; (4) acquisition of containers for permanent disposal of the solidified waste; (5) temporary storage of the solidified waste, followed by transportation to an appropriate Federal repository for permanent disposal; (6) decontamination and decommissioning of the waste tanks and facilities, material and hardware used in carrying out the solidification of the wastes; and (7) disposal of low-level and transuranic wastes produced from project activities.

The principal operation at West Valley is currently the solidification of approximately 2,200 m^3 of liquid high-level waste into borosilicate glass using vitrification The primary vitrification campaign began in June 1996 and was completed in June 1998 Vitrification of the high-level waste tank heels is underway and will continue through FY 2001.

In preparation for initiating the vitrification program, the entire inventory of liquid high-level waste was pretreated between 1988 and 1995. This processing produced 20,000 drums containing low-level waste liquid stabilized in cement. These drums are being temporarily stored on-site pending a decision on permanent disposal relative to the Record of Decision for project completion

Following the vitrification of the high-level waste, the buildings and other facilities will be decontaminated and decommissioned, based on the results of an Environmental Impact Statement and Record of Decision for the completion of the project This phase of the cleanup project is expected to begin in late FY 2000. The project cost is estimated to range from $2.5 billion to $3 5 billion, to coincide with the estimated completion date (through FY 2015 dependent upon the Environmental Impact Statement/Record of Decision). This estimate will be refined after the Environmental Impact Statement/Record of Decision is published.

Another critical element of the EM program at West Valley is the safe management of 125 spent nuclear fuel elements which are stored at the site Environmental Management will continue surveillance and maintenance of the spent fuel facility to ensure safe storage until the fuel can be shipped to the Idaho National Engineering and Environmental Laboratory (currently planned for 2001).

Achieving project completion depends upon the Department's ability to implement the decisions made in the Environmental Impact Statement Record of Decision, as well as early identification of receiver sites and stakeholder agreements to accept West Valley Demonstration Project high-level waste and transuranic waste, and on funding support at the level which was the basis of the June 1998 *Accelerating Cleanup: Paths to Closure* document. The New York State Energy Research and Development Authority and DOE are formulating a preferred alternative for project completion and closure or long-term management of the site that incorporates stakeholders' input, including the Citizens Task Force's recommendations. Selection of a preferred alternative and subsequent Record of Decision will determine final disposition of the wastes and facilities at the West Valley site and allow for the return of the site to New York State.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The Ohio projects are managed through incentivized contracts and utilize fixed-price subcontracts to assure the most efficient service to the Government. This scope planned for FY 2000 has been reviewed and is consistent with the goals of the site as outlined in the *Accelerating Cleanup: Path to Closure*. The Ohio projects included in this section of the budget have had independent reviews of their baseline scopes and costs. The scope and funding requested for FY 2000 are consistent with the activities that have been reviewed.			
OH-CL-01 / King Avenue Site Decontamination			
Decontamination of the King Avenue site was completed in FY 1998.			
■ Completion of Building KA-7 underground drain removal and associated work.			
■ Completion of external area final surveys.			
■ Final independent verification surveys and report.			
OH-CL-01	5,615	1,219	1,500

Metrics			
Remedial Action/Release Sites			
Assessments	0.0	0.0	1.0
Cleanups	0.0	0.0	1.0
Facility Decommissioning			
Assessments	1.0	0.0	0.0
Cleanups	1.0	0.0	1.0

OH-CL-02 / West Jefferson Site Decontamination

This project involves facility decommissioning at the West Jefferson site including the Hot Cell area from the retired reactor research facility, which requires quality assurance, waste management, and health and safety support during decommissioning. Upon completion, buildings will be demolished and grounds will be returned to Battelle for reuse without radiological restriction.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Continue transuranic waste volume reduction utilizing the Sonatol system and associated decontamination operations of the West Jefferson buildings which include material and equipment removal; continue health and safety support, and emergency preparedness. Initiate decontamination operations within JN-2 (Critical Assembly Building) and JN-3 (Reactor Building), and on the external areas, as funding permits, in order to balance radiation dose to workers			
OH-CL-02	457	5,750	5,134

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

OH-CL-03 / Project Management, Site Support & Maintenance

The scope of this project is to provide technical support to the field work involved in the two decontamination projects, (King Avenue and West Jefferson sites), including surveillance and maintenance, project management and regulatory compliance.

- Continue to provide required core environmental and surveillance and maintenance activities, including facility structural/hazard analysis of major building systems.
- Provide program management support, including public affairs, regulatory compliance, quality assurance, and project management.

OH-CL-03	1,677	1,563	659

Metrics
No quantifiable corporate performance measures are associated with this project.

OH-MB-02-N / Main Hill Tritium (Non-Defense Funded)

This project provides for the safe shutdown, dismantlement, and decontamination of the Semi-Works Cave area.

- Primary activities include equipment disposition and waste removal.

OH-MB-02-N	992	1,003	1,000

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics
No quantifiable corporate performance measures are associated with this project.

OH-WV-01 / High-Level Waste Vitrification and Tank Heel High Activity Waste Processing

The high-level waste program at West Valley encompasses the solidification of approximately 2200 m^3 of liquid high-level waste into borosilicate glass using vitrification. Liquid high-level waste vitrification operations were initiated in June 1996, and the primary vitrification campaign was completed in the third quarter of FY 1998. This represents a significant achievement for DOE and a critical activity toward completion of the West Valley Demonstration Project Act. After high-level waste liquid processing, the project will continue to use vitrification to process the high-level waste tank heels and residual high activity waste. Planning and preparatory work is currently underway, and vitrification is continuing. There is a high base cost to operate and maintain the vitrification process and the innovative technology for tank heels extraction adds to the cost. This activity, including the deactivation of the vitrification processing facility, will continue into FY 2002.

- Continue operation of vitrification facility to treat approximately 50 m^3 of high-level waste tank heels and residuals, reducing the remaining inventory to 32 m^3 and resulting in production of approximately 5 canisters of high-level waste.
- Operate tank farm in support of vitrification.
- Install high-level waste tank heel removal equipment (equipment and pump modifications)
- Finalize strategies for completion of vitrification and cutoff of effluents to tanks and facilities used for vitrification.

OH-WV-01	53,000	43,800	43,100

Metrics			
High-Level Waste (m^3)			
Storage	182.0	82.0	32.0
Treatment	780.0	100.0	50.0

(dollars in thousands)

FY 1998	FY 1999	FY 2000

OH-WV-02 / Site Transition, Decommissioning, & Project Completion

These activities are required to remove high-level waste canisters and transuranic waste from project facilities, dispose of low level waste in accordance with the West Valley Demonstration Project Act and Stipulation of Compromise as directed by the Record of Decision, implementation of other related activities associated with the Record of Decision, and completion of the remaining project responsibilities and return the site to New York State. The State of New York and DOE are working together to formulate a preferred alternative with input from the public, including the Citizens Task Force. The subsequent Record of Decision will provide the decision to implement the preferred alternative. Outyear work scope has been revised to include modifications to existing canister storage location in the main process building or investigation of other storage options. These activities run concurrently with high-level waste vitrification processing and tank residual high activity waste processing with estimated completion through FY 2015 dependent upon Environmental Impact Statement/Record of Decision alternative selected.

- Continue to safely store disposal-ready high-level waste canisters.
- Continue environmental monitoring.
- Operate site safely and compliantly.
- Complete Remote Handled Waste Facility design.
- Address Supplement to the Draft Environmental Impact Statement comments and issue Final Environmental Impact Statement for public review
- Issue Environmental Impact Statement Record of Decision.
- Develop Record of Decision implementation plan and initiate cost/schedule baseline development for West Valley Demonstration Project Completion.
- Continue sitewide radwaste classification program (for low-level and transuranic waste).
- Continue canister ship-out design efforts; investigate storage options.
- Continue limited low-level waste disposal activities.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Initiate activities, at a reduced level, for removal of Spent Nuclear Fuel debris from the Head End Cells of the main plant.			
OH-WV-02	17,185	30,753	29,553

Metrics			
High-Level Waste (cn)			
Canisters Produced	81.0	15.0	5.0
Low-Level Waste (m^3)			
On-Site/Commercial Disposal	106.0	425.0	425.0
Storage	16,295.0	16,240.0	16,185.0
Mixed Low-Level Waste (m^3)			
On-Site/Commercial Disposal	1.0	0.0	0.0
Storage	149.0	147.0	142.0
Treatment	45.0	9.0	12.0
Transuranic Waste (m^3)			
Storage	528.0	532.0	536.0

OH-WV-03 / Spent Nuclear Fuel

The Fuel Receiving and Storage Facility at West Valley contains 125 irradiated commercial spent nuclear fuel elements that must be transferred off-site during calendar year 2001 (per agreement with the State of Idaho and the State of New York). In FY 2000, complete the transition from maintaining safe storage of spent nuclear fuel to readying the fuel and systems; maximum safety; initiate shipment to Idaho National Engineering and Environmental Laboratory in 2001 to avoid penalties and court action by New York State regulators.

- Complete upgrades for the rail spur.
- Staff and train fuel handling and cask loading crews.
- Maintain safe storage of fuel and inspect spent nuclear fuel in preparation for shipment.
- Complete training of crews for fuel handling and cask unloading at Idaho National Engineering and Environmental Laboratory and complete readiness assessments for transportation and receipt of the West Valley Demonstration Project -Spent Nuclear Fuel.

OH-WV-03	1,561	2,800	4,900

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Spent Nuclear Fuel			
Not Disposal Ready (MTHM)	27.0	27.0	27.0
Not Disposal Ready (m^3)	11.3	11.3	11.3

OH-WV-04 / Project Management/Site Support

This project provides for management of basic facilities, equipment, installations, and related services essential for occupation and operation of the site. This includes roads, utilities, environmental monitoring, analytical laboratories, safeguards and security, offices, warehouses, corrective maintenance, and preventive maintenance. It also includes technical support and contract expertise in evaluating waste management activities. It includes activities related to strategic planning, information activities, and field management. Also included are preparation of project baseline summaries, risk data sheet documentation, integrated priority lists, site-wide technical baselines, facility plans, system engineering, and complex-wide plans.

- Continue facility management and maintenance, radiological control programs, industrial health and safety programs, logistics support, environmental monitoring, administration of laboratories, and administration of the quality assurance program.
- Continue security and safeguards, training, procurement, accounting, legal, records management, public information, human resources, program control administration, and management information services.

OH-WV-04	42,000	30,000	29,800
Metrics			
No quantifiable corporate performance measures are associated with this project.			
Total, Ohio	122,487	116,888	115,646

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OH-CL-01 / King Avenue Site Decontamination	
■ Increase is needed to support completion of Building KA-7 underground drain removal and associated work and final surveys and report.	281
OH-CL-02 / West Jefferson Site Decontamination	
■ This site is split funded between the Non-Defense and Defense activities. As the Non-Defense preparation work for decommissioning decreases the defense activities increase.	-616
OH-CL-03 / Project Management, Site Support & Maintenance	
■ There is a correlation between Non-Defense and Defense support needed in relation to the type of work being supported; decrease in scheduled work to be performed under the Non-Defense Appropriation.	-904
OH-MB-02-N / Main Hill Tritium (Non-Defense Funded)	
■ Funding level is essentially stable.	-3
OH-WV-01 / High Level Waste Vitrification and Tank Heel High Activity Waste Processing	
■ Decrease is due to elimination of development and deployment of oxalic acid wash technology, which was for residual waste removal from the high-level waste tanks	-700
OH-WV-02 / Site Transition, Decommissioning & Project Completion	
■ Decrease reflects deferral of procurement and construction activities for the Remote Handled Waste Facility and the high-level waste Canister Ship-out Facility.	-1,200
OH-WV-03 / Spent Nuclear Fuel	
■ Spent Nuclear Fuel Shipment from West Valley Demonstration Project to Idaho National Engineering and Environmental Laboratory is scheduled to occur in FY 2001. The additional funding in FY 2000 is to continue safe storage of the fuel, as well as ready the fuel and systems to begin shipments. Examples of the types of activities include cask certification, procurement of materials and equipment, training of fuel handlers, verification of procedures, and line management self assessment. The 1.8 mile rail spur which services the West Valley Demonstration Project will also be upgraded	2,100
OH-WV-04 / Project Management/Site Support	
■ Funding level essentially stable with a slight decrease due to the continued emphasis on cost effectiveness improvement and productivity enhancement through labor reductions for support categories; reductions in computer software support.	-200
Total Funding Change, Ohio	-1,242

Site/Project Completion

Program Mission

The Non-Defense Site/Project Completion account provides funding for projects that are expected to be completed by FY 2006 at sites or facilities where a Department of Energy (DOE) mission will continue (e.g., environmental management or scientific research) beyond FY 2006. Hence, this account focuses on the completion of specific Environmental Management (EM) projects at sites with expected enduring missions.

This account includes projects and sites under the following operations offices: Albuquerque, Chicago, Idaho, Oakland, and Richland In a limited number of cases, sites have been placed in the Site/Project Completion account even though there is no expectation of a continuing mission after cleanup is completed. In these instances, use of the Site Closure account would have created an additional appropriation control for an Operations/Field office with a limited amount of associated funding, thereby hindering managerial flexibility in the execution of projects at these sites.

Program Goal

The FY 2000 budget request will enable the EM program to continue its goal of completing its cleanup mission at as many sites as possible by 2006. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths To Closure* document, whereby EM sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules.

Program Objective

- To continue environmental cleanup projects that are expected to be completed by 2006 at EM sites where overall site cleanup will not be fully accomplished by 2006.
- To continue environmental cleanup projects at DOE sites where all EM projects are expected to be completed by 2006 (except for long-term stewardship activities), but where there will be a continuing federal workforce at the site to carry out enduring non-EM missions, such as nuclear weapons activities or scientific research, and the necessary waste management activities to handle newly generated wastes from these missions.

Performance Measures

The Office of Environmental Management has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component of the effort to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	789	478	481	3	0.6%
Chicago Operations Office	45,279	54,063	54,100	37	0.1%
Idaho Operations Office	7,501	10,027	9,208	-819	-8.2%
Oakland Operations Office	39,065	34,894	35,659	765	2.2%
Richland Operations Office	19,053	1,863	1,418	-445	-0.5%
Total, Site/Project Completion, Non-Defense	111,687	101,325	100,866	-459	-0.5%

Public Law Authorization:

Public Law 105-245, "The Energy and Water Development Appropriations Act, 1999"

Public Law 95-91, "Department of Energy Organization Act (1977)"

Public Law 103-62, "Government Performance and Results Act of 1993"

Albuquerque

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management (EM) Site/Project Completion program, managed through the Albuquerque Operations Office, is to support activities at one site in one state, the Lovelace Biomedical and Environmental Research Institute, formerly the Inhalation Toxicology Research Institute, in New Mexico.

Program Goal

The Lovelace Biomedical and Environmental Research Institute currently operates under a cooperative agreement with the Department of Energy. The goal is to continue to support treatment, storage, and disposal of newly generated waste in support of the Department's mission-related work. At this time, the Office of Science, the landlord, is considering transition of waste management activities into the landlord program.

Program Objective

Until the transition to landlord occurs, the Albuquerque program objective is to manage generated waste, including the treatment, storage, and disposal of low-level waste, mixed low-level waste, transuranic, and hazardous wastes; support program management activities for the waste management/environmental restoration programs; and continue groundwater surveillance and monitoring. It is assumed that the cooperative agreement will remain in place until FY 2006.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Shipped small quantities of transuranic waste to Sandia National Laboratory for interim storage pending regulatory changes that would permit disposal at the Waste Isolation Pilot Plant.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AL-005 / Lovelace Biomedical and Environmental Research Institute	789	478	481	3	0.6%
Total, Albuquerque	789	478	481	3	0.6%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Lovelace Biomedical and Environmental Research Institute	789	478	481	3	0.6%
Total, Albuquerque	789	478	481	3	0.6%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Transuranic Waste			
Storage (m^3)	0.3	0.3	0.3
Low-Level Waste			
Treatment (m^3)	9.0	30.0	30.0
Shipped to DOE Disposal Site (m^3)	63.0	0.0	0.0
Hazardous Waste			
Disposed On-Site/Commercial (MT)	4.5	5.0	4.0

Site Description

Lovelace Biomedical and Environmental Research Institute

The Lovelace Biomedical and Environmental Research Institute is located on Kirtland Air Force Base in Albuquerque, New Mexico. The site currently operates under a cooperative agreement with the Department of Energy doing biomedical research. All of the environmental restoration sites have been cleaned up Monitoring and surveillance of the sites continue to support closure and to monitor the reduction of nitrates in groundwater beneath the former wastewater lagoons. The Waste Management Program manages hazardous, low-level radioactive, mixed, transuranic, and non-hazardous biomedical wastes generated from on-going DOE research activities in an efficient and environmentally sound manner.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
AL-005 / Lovelace Biomedical and Environmental Research Institute			
This project provides compliant waste management for biomedical research waste and environmental restoration groundwater monitoring and surveillance.			
■ Continue providing support for the compliant treatment, storage, and disposal of transuranic, mixed low-level waste, and low-level waste; and continue groundwater surveillance and monitoring.			
AL-005	789	478	481
Metrics			
Transuranic Waste			
Storage (m^3)	0.3	0.3	0.3
Low-Level Waste			
Treatment (m^3)	9.0	30.0	30.0
Shipped to DOE Disposal Site (m^3)	63.0	0.0	0.0
Hazardous Waste			
Disposed On-site/Commercial (MT)	4.5	5.0	4.0
Total, Albuquerque	789	478	481

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
AL-005 / Lovelace Biomedical and Environmental Research Institute	
■ Essentially stable funding is provided, as inflationary cost increase is offset by workscope reduction	3
Total Funding Change, Albuquerque	3

Chicago

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management (EM) Site/Project Completion program carried out by the Chicago Operations Office, is to direct and manage EM activities at seven sites in five states. These sites include the Ames Laboratory in Iowa; the Argonne National Laboratory-East, Site A and Fermi National Accelerator Laboratory in Illinois; the Argonne National Laboratory-West in Idaho; Princeton Plasma Physics Laboratory in New Jersey; and the Brookhaven National Laboratory in New York.

The primary mission of the facilities under the Chicago Operations Office is research, development, and demonstration for DOE's Office of Science and Nuclear Energy programs. This includes support of the nation's advanced reactor program and research on the fundamental properties of matter, physics, life and environmental sciences; magnetic confinement fusion and high-energy physics. The two components of the Chicago Environmental Management Program are environmental restoration and waste management. Environmental restoration activities managed by the Chicago Operations Office include the management of groundwater, soil and debris contaminated with radionuclides and/or hazardous substances.

The Chicago environmental restoration strategy focuses on maximizing near-term site completions, optimizing the sequencing of work and accelerating schedules. This strategy has proven to be successful in that environmental restoration activities at Chicago sites, such as Site A and Ames have been completed, allowing allocated funding to be devoted to fewer remaining sites. For the waste management activities, Chicago's strategy continues to be focused upon the disposition of legacy waste inventories, cost-effective waste handling, and pollution prevention programs designed to reduce and minimize the generation of new waste. This strategy has been successful. Waste inventories, generated in decades past and stockpiled at Chicago sites, have been dramatically reduced in the past several years, thereby reducing storage costs and risk.

Waste management responsibilities have been transferred to the Office of Science for Fermi National Accelerator Laboratory, and to the Office of Nuclear Energy for Argonne National Laboratory-West. Management and funding for surveillance and maintenance at Site A/Plot M in Illinois, the Hallam site in Nebraska, and the Piqua site in Ohio have been transferred to the Long Term Surveillance and Maintenance program, which is managed by the Grand Junction Project Office in Colorado.

Program Goal

The goal of the Chicago Operations Office and the EM program is to complete remediation of all Chicago sites by 2006, and to transfer management of all newly-generated waste from ongoing operations back to the generator. There is expected to be no EM funding for Chicago sites beyond 2006. Chicago is pursuing waste management initiatives to reduce and contain costs, and to enhance productivity.

Program Objectives

The EM objective at the Chicago Operations Office is to manage the risks associated with sites contaminated with various hazardous and radioactive materials. This includes responsibility for the assessment and remediation of contaminated sites and facilities; characterization, treatment, minimization, storage and disposal of hazardous and radioactive waste; development, demonstration, testing, and evaluation of new cleanup technologies; environmental safety; and completion of decontamination and decommissioning of surplus facilities in the current EM baseline. The Chicago Operations Office proactively employs innovative and alternative technologies, wherever appropriate and applicable, to address remedial, as well as decontamination and decommissioning problems, in order to reduce cost, risk, and to improve the schedule.

Environmental restoration activities at Chicago will be complete at all sites except Argonne National Laboratory-East, Argonne National Laboratory-West and Brookhaven National Laboratory by the end of FY 1999. Discussions are underway with the DOE's Office of Science regarding the transfer of continuing surveillance and monitoring activities at the Princeton Plasma Physics Laboratory Site C/D. Remediation activities will continue under the Brookhaven National Laboratory Interagency Agreement/Federal Facilities Agreement, the Argonne National Laboratory-West Federal Facility Agreement/Consent Order and the Argonne National Laboratory-East Resource Conservation and Recovery Act Part B Corrective Action permit. Waste management activities at Chicago are designed to ensure minimization, safe handling, collection, storage, treatment and disposal of waste for generators at Ames, Argonne National Laboratory-East, Brookhaven National Laboratory, and Princeton Plasma Physics Laboratory. The main types of waste associated with these facilities are low-level waste, mixed low-level, hazardous, and transuranic waste.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the detailed program justification.

Significant Accomplishments and Program Shifts

- At Brookhaven National Laboratory assessment activities included: (1) completion of five release site assessments associated with the Sewage Treatment Plant and Peconic River landfills and groundwater; and (2) continuation of site-wide characterization activities. Remediation activities included: (1) completion of nine release sites, (2) continuation of waste disposal from 55 buried waste pits, (3) completion of drinking water hookups for over 1,500 offsite residences from FY 1996 through FY 1998, (4) continuation of groundwater treatment activities, (5) continued remediation of the Central Steam Facility, and (6) begin design and construction of innovative technology of in-well air sparging for off-site groundwater remediation. This technology will provide a substantially less invasive presence off-site on non-DOE owned property and is expected to reduce long-term operation and maintenance costs compared to pump and treat technology. Packaging, transportation, and off-site processing of boneyard removals will be partially accomplished (FY 1998). At Brookhaven National Laboratory, site-wide characterization activities will be completed and Graphite Reactor characterization activities will be undertaken. Remedial actions include completion of two release sites and continuation of remediation of operable units/removal actions including the Central Steam Facility, waste management areas, and the groundwater. Packaging, transportation, and off-site processing of boneyard waste removals at the old Hazardous Waste Management Facility will continue (FY 1999).
- Performed all necessary activities to compliantly treat, store, and dispose all applicable waste types at Brookhaven National Laboratory (FY 1998) and will continue to perform these activities (FY 1999).
- At Brookhaven National Laboratory, continue on-site groundwater treatment systems and soil vapor extraction systems, initiate soil excavation and disposal; complete construction of additional off-site groundwater treatment system; initiate remediation of Peconic River sediments; store, treat, and dispose of low-level, hazardous and mixed waste; treat and dispose of additional legacy waste (FY 2000).
- At Argonne National Laboratory-East, the field work associated with the 317 Area French Drain continued. Remaining remedial actions work involved the completion of two release site assessments and demonstration of soil-mixing technology. Performed all necessary activities to compliantly treat, store, and dispose all applicable waste types at Argonne National Laboratory-East. Completed construction of one line-item project (Waste Management Facility Upgrade) at Argonne National Laboratory-East (FY 1998). At Argonne National Laboratory-East, remedial actions effort will continue and one release site will be completed. Decontamination and decommissioning activities include continuing decontamination and decommissioning of the Chicago Pile-5 reactor and beginning decontamination and decommissioning of 60 inch Cyclotron. Perform all necessary activities to compliantly treat, store, and dispose all applicable waste types at Argonne National Laboratory-East (FY 1999).

- At Argonne National Laboratory-East, continue corrective actions including capping in place and engineered barriers; complete decontamination and decommissioning of the 6-inch Cyclotron Reactor and the Chicago Pile-5 Reactor; initiate decontamination and decommissioning of the Zero Power and Juggernaut Reactors; store, treat, and dispose of mixed, low-level and hazardous waste; collect, store, and treat transuranic waste (FY 2000).
- At Argonne National Laboratory-West, assessment of eight release sites and one facility was accomplished, as well as the completion of three release sites and one facility. Bench scale testing of an innovative technology, phytoremediation, was completed for remediation of remaining Waste Area Group 9 facilities. Facility decommissioning of the Central Liquid Waste Processing Area was completed. Waste management responsibilities were transferred to the Office of Nuclear Energy at the end of FY 1997. At Argonne National Laboratory-West, the two year validation of innovative technology (phytoremediation) for the Waste Area Group 9 site will begin (FY 1999).
- At Argonne National Laboratory-West, continue final remedial action (soil treatment) (FY 2000).
- At Princeton Plasma Physics Laboratory, activities were conducted to assess and reduce risk and comply with the Memorandum of Understanding between the New Jersey Department of Environmental Protection and Princeton University. This included assessment and completion of all eight release sites at Sites C/D. In addition to normal waste operations, low-level waste generated included materials from Tokamak Fusion Test Reactor caretaking operations being performed by the Office of Science. It is anticipated that the quantity of waste will remain consistent with historical levels because of the construction and facility preparations for the National Spherical Tokamak Experiment. Performed all necessary activities to compliantly treat, store, and dispose all applicable waste types at Princeton Plasma Physics Laboratory (FY 1998). At Princeton Plasma Physics Laboratory restoration activities consist of long-term groundwater monitoring. The major waste operations focus will be on disposal of materials from the Tokamak Fusion Test Reactor caretaking operations. In addition, operations of the National Spherical Tokamak Experiment are scheduled to begin. Perform all necessary activities to compliantly treat, store, and dispose all applicable waste types at Princeton Plasma Physics Laboratory (FY 1999).
- At Princeton Plasma Physics Laboratory, conduct surveillance and monitoring of the Site C/D; safely and compliantly store, treat, and dispose of hazardous waste and low-level waste (FY 2000).
- Potentially responsible party payments will be made against DOE's portion of Princeton University Site A/B remediation costs as a Potentially Responsible Party (FY 1999).
- At Princeton Plasma Physics Laboratory, conduct surveillance and monitoring of the Site C/D; safely and compliantly store, treat, and dispose of hazardous waste and low-level waste (FY 2000).
- At Ames, remediation activities (other than continued low levels of surveillance and monitoring) were completed. Performed all necessary activities to compliantly treat, store, and dispose all applicable waste types at Ames (FY 1998), and will continue to perform these waste management activities (FY 1999).
- At Ames Laboratory, store, treat and dispose of transuranic, mixed, and low-level waste (FY 2000)

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
CH-AMESWO / AMES Waste Operations	260	306	260	-46	-15.0%
CH-ANLEDD / Argonne National Laboratory-East Decontamination and Decommissioning Actions	570	5,732	6,898	1,166	20.3%
CH-ANLEPM / Argonne National Laboratory-East Program Management	657	572	763	191	33.4%
CH-ANLERA / Argonne National Laboratory-East Remedial Actions	3,290	3,644	4,500	856	23.5%
CH-ANLEWO / Argonne National Laboratory-East Waste Operations	7,251	8,222	7,600	-622	-7.6%
CH-ANLWRA / Argonne National Laboratory-West Remedial Actions	2,030	1,142	809	-333	-29.2%
CH-ANLWWO / Argonne National Laboratory-West Waste Operations	1,600	0	0	0	0.0%
CH-BRNLBYW / Brookhaven National Laboratory Boneyard Waste	1,801	1,151	2,787	1,636	142.1%
CH-BRNLDD / Brookhaven National Laboratory Decontamination and Decommissioning	143	3,023	130	-2,893	-95.7%
CH-BRNLPM / Brookhaven National Laboratory Program Management	3,393	3,503	3,647	144	4.1%
CH-BRNLRA / Brookhaven National Laboratory Remedial Actions	15,263	14,906	14,901	-5	0.0%
CH-BRNLWO / Brookhaven National Laboratory Waste Operations	5,537	7,418	8,088	670	9.0%
CH-CHOOPUAB / Princeton Site A/B Payments	153	504	644	140	27.8%
CH-COPS / Chicago Operations Program Support	41	597	0	-597	-100.0%
CH-PPPLRA / Princeton Plasma Physics Laboratory Remedial Actions	424	351	273	-78	-22.2%
CH-PPPLWO / Princeton Plasma Physics Laboratory Waste Operations	2,866	2,992	2,800	-192	-6.4%
Total, Chicago	45,279	54,063	54,100	37	0.1%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AMES Laboratory (Iowa State University) (IA)	260	306	260	-46	-15.0%
Argonne National Laboratory-East (IL)	11,768	18,170	19,761	1,591	8.8%
Argonne National Laboratory-West (ID)	3,630	1,142	809	-333	-29.2%
Brookhaven National Laboratory (NY)	26,137	30,001	29,553	-448	-1.5%
Chicago Operations Office (IL)	194	1,101	644	-457	-41.5%
Princeton Plasma Physics Laboratory (NJ)	3,290	3,343	3,073	-270	-8.1%
Total, Chicago	45,279	54,063	54,100	37	0.1%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Sites			
Assessments	24.0	14.0	5.0
Cleanups	20.0	8.0	14.0
Facility Decommissioning			
Assessments	23.0	0.0	1.0
Cleanups	8.0	2.0	11.0
Transuranic Waste			
Storage (m^3)	90.0	92.1	94.2
Treatment (m^3)	11.2	85.2	85.2
Shipped to DOE Disposal Site (m^3)	0.0	2.3	2.3
Mixed Low-Level Waste			
Storage (m^3)	154.8	157.0	152.8
Treatment (m^3)	40.7	30.5	30.5
Disposed On-site/Commercial (m^3)	2.6	11.1	17.5
Low-Level Waste			
Storage (m^3)	334.1	213.6	80.6
Treatment (m^3)	619.0	1,053.4	1,051.4
Disposed On-site/Commercial (m^3)	118.0	173.6	227.7
Shipped to DOE Disposal Site (m^3)	424.7	573.8	491.9

Site Description

AMES Laboratory (Iowa State University)

Ames Laboratory is an Energy Research laboratory in Ames, Iowa that conducts basic and applied research in the preparation, characterization, and evaluation of properties of metals and their alloys, especially rare earth metals. Ames Laboratory also performs materials research, high-performance computing, and environmental research. It seeks solutions to energy-related problems through the exploration of physics, chemistry, engineering, applied mathematics, and materials sciences.

Argonne National Laboratory-East

Argonne National Laboratory-East is a research laboratory occupying a 700 acre tract of land located approximately 22 miles southwest of downtown Chicago in DuPage County, Illinois. It is an Office of Science multidisciplinary research and development laboratory that conducts basic and applied research to support the development of energy-related technologies. Energy-related research projects include safety studies for light-water reactors, developing components and materials for fission and fusion reactors, superconductivity research, improvements in coal power, synchrotron radiation sources, and waste heat utilization. Further research includes medical radioisotope technology, environmental research, genetics research, materials engineering, ceramics, carcinogenesis, and the biological effects of ionizing radiation. Argonne-East is the home for the Advanced Photon Source Facility, which provides experiment capability with the use of photons for industry, government, and academic scientists to create advances in pharmaceuticals, adhesives, food processing, and many other applications.

Argonne National Laboratory-West

The Argonne National Laboratory-West site is located 35 miles west of Idaho Falls, Idaho, and is operated by the University of Chicago under the direction of the Chicago Operations Office. The site was constructed for the purpose of carrying out research and development for liquid metal fast breeder reactor technology. All remediation activities, except for continued implementation of the selected remedy, are projected to be complete at Argonne National Laboratory-West by the end of FY 2000. Beginning in FY 1998, the responsibility for managing newly generated waste, as part of the reengineering pilot program, was transferred to DOE's Office of Nuclear Energy. The current mission for Argonne National Laboratory-West includes technology development for spent nuclear fuel and radioactive waste treatment, reactor and fuel cycle safety, and closure of the Integral Fast Reactor Program. These activities are administered through the Office of Nuclear Energy.

Brookhaven National Laboratory

The Brookhaven National Laboratory site is a multi-purpose research and development laboratory located in central Suffolk County on Long Island, about 60 miles east of New York City. Brookhaven National Laboratory's current mission is to conduct fundamental research, including conception, design, construction, and operation of large complex research facilities. These facilities are used for both basic and applied research in high energy and nuclear physics; in basic energy sciences emphasizing fundamental research on biological, chemical, and physical phenomena underlying energy-related transfer, conversion and storage systems; in life sciences; and in nuclear medical applications of nuclear techniques. The DOE Office of Science also provides funding for Brookhaven National Laboratory cleanup activities.

Princeton Plasma Physics Laboratory

The Princeton Plasma Physics Laboratory in Princeton, New Jersey, is a single purpose laboratory focusing on research and development for fusion energy programs. The Laboratory is engaged in a broad spectrum of plasma physics research ranging from the theoretical analysis and modeling of fusion plasmas to the laboratory testing of plasmas approaching the conditions necessary for an energy producing fusion reactor.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Chicago EM program makes extensive use of firm fixed-price subcontracts and other subcontracting mechanisms, such as basic ordering agreements and time and material subcontracts, to assure the most cost-effective services to the Government.

The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in *Accelerating Cleanup: Paths to Closure*. The two major environmental restoration programs at Argonne National Laboratory-East and Brookhaven National Laboratory have had independent cost reviews by the Army Corps of Engineers and are baselined and under formal change control procedures. Waste management activities have baselines established for a seven year period. In addition, there have been independent reviews of current year work plans, and benchmarking of hazardous waste management operations against commercial research operations to identify best practices.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-AMESWO / AMES Waste Operations			
This project performs all necessary activities to safely and compliantly store, treat, and dispose of waste. These activities are essential for the ongoing Office of Science program mission.			
■ Safely and compliantly store, treat, and dispose each waste type in quantities as provided in the metrics table below.			
CH-AMESWO	260	306	260
Metrics			
Transuranic Waste			
Storage (m^3)	0.0	0.1	0.2
Low-Level Waste			
Storage (m^3)	3.6	1.0	0.0
Treatment (m^3)	0.0	7.0	5.0
Disposed On-site/Commercial (m^3)	0.0	7.0	5.0
CH-ANLEDD / Argonne National Laboratory-East Decontamination and Decommissioning Actions			
This project conducts facility decontamination and decommissioning activities.			
■ Complete decontamination and decommissioning of the 60 inch Cyclotron Reactor.			
■ Complete decontamination and decommissioning of the Chicago Pile-5 Reactor.			
■ Initiate characterization for decontamination and decommissioning of Zero Power, and Juggernaut Reactors.			
CH-ANLEDD	570	5,732	6,898
Metrics			
Facility Decommissioning			
Assessments	22.0	0 0	1.0
Cleanups	7.0	2.0	11.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-ANLEPM / Argonne National Laboratory-East Program Management			
This project provides program management support activities to provide a safe and effective environmental management program to reduce environmental and health risks, including support of compliance, quality, safety and health, project technical support including technology application, sample and data management, design support, and project and program support.			
■ Continue support to the Argonne National Laboratory-East Remedial Action and Decontamination/Decommissioning programs, including cost and schedule plans and reporting; stakeholder and regulatory interactions, budget preparation; and data calls.			
CH-ANLEPM	657	572	763
Metrics			
No quantifiable corporate performance measures are associated with this project.			
CH-ANLERA / Argonne National Laboratory-East Remedial Actions			
This project conducts remediation activities at Argonne National Laboratory-East to reduce risk and comply with the Resource Conservation and Recovery Act permit which was also funded under the Defense EM appropriation through FY 1998.			
■ Continue corrective actions (primarily capping in place or engineered barriers) for the 300 Area Vaults and Rest of Site Area.			
CH-ANLERA	3,290	3,644	4,500
Metrics			
Remedial Actions/Release Sites			
Assessments	4.0	2.0	5.0
Cleanups	0.0	7.0	10.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-ANLEWO / Argonne National Laboratory-East Waste Operations			
This project performs all necessary activities to safely and compliantly store, treat, and dispose of waste. These activities are essential for the ongoing Office of Science program mission ■ Safely and compliantly store, treat and dispose of each waste type in quantities of waste as provided in the metrics table below. ■ Continue programmatic supervision and support for activities, including cost and schedule control; project integration and performance; community relations; regulatory actions; and engineering support.			
CH-ANLEWO	7,251	8,222	7,600

Metrics			
Transuranic Waste			
Storage (m^3)	90.0	92.0	94.0
Treatment (m^3)	11.2	85.2	85.2
Shipped to DOE Disposal Site (m^3)	0.0	2.3	2.3
Mixed Low-Level Waste			
Storage (m^3)	143.0	147.9	152.8
Treatment (m^3)	40.7	27.8	27.8
Low-Level Waste			
Storage (m^3)	113.0	71.0	71.0
Treatment (m^3)	301.0	308.5	308.5
Shipped to DOE Disposal Site (m^3)	283.3	199.6	117.7

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-ANLWRA / Argonne National Laboratory-West Remedial Actions			
This project conducts activities at the Argonne National Laboratory-West Waste Area Group 9 to assess and reduce risk and comply with the Federal Facilities Agreement/Consent Order.			
■ Perform second year of two-year planning/verification process for innovative remediation technology (phytoremediation) under Record of Decision.			
CH-ANLWRA	2,030	1,142	809
Metrics			
Remedial Actions/Release Sites			
Assessments	8.0	0.0	0.0
Cleanups	4.0	0.0	4.0
Facility Decommissioning			
Assessments	1.0	0.0	0.0
Cleanups	1.0	0.0	0.0
CH-ANLWWO / Argonne National Laboratory-West Waste Operations			
This project performs all necessary activities to safely and compliantly store, treat, and dispose of waste. FY 1998 funds covered remaining transition to the Office of Nuclear Energy.			
■ All activity transferred to the Office of Nuclear Energy in FY 1997.			
CH-ANLWWO	1,600	0	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-BRNLBYW / Brookhaven National Laboratory Boneyard Waste			
This project treats and disposes of legacy wastes at the old Hazardous Waste Management Area, such as bin sludges, connex and concrete containers, dry active wastes, and shielding blocks/debris. Wastes must be disposed before soil remediation in this area can begin.			
■ Treat and dispose of additional wastes at old Hazardous Waste Management Facility.			
CH-BRNLBYW	1,801	1,151	2,787
Metrics *No quantifiable corporate performance measures are associated with this project.*			
CH-BRNLDD / Brookhaven National Laboratory Decontamination and Decommissioning Actions			
This project characterizes, stabilizes, remediates, decontaminates and decommissions the Brookhaven Graphite Research Reactor.			
■ Continue characterization activities.			
■ Stabilization activities will be primarily funded by the DOE Office of Science, in preparation for decommissioning by the Office of Environmental Management beginning in FY 2001.			
CH-BRNLDD	143	3,023	130
Metrics This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
CH-BRNLPM / Brookhaven National Laboratory Program Management			
This project provides program management support activities to provide a safe and effective environmental management program to reduce environmental and health risks, including support of compliance, quality, safety and health, project technical support including technology application, sample and data management, design support, and project and program support. It also includes funding for an Interagency Agreement with New York State Department of Environmental Conservation for oversight.			
■ Continue programmatic supervision and support for Interagency Agreement activities, including cost and schedule control; project integration and performance; community relations; regulatory actions; and engineering support.			
CH-BRNLPM	3,393	3,503	3,647
Metrics			
No quantifiable corporate performance measures are associated with this project.			
CH-BRNLRA / Brookhaven National Laboratory Remedial Actions			
This project addresses areas with known or potential risk to human health and the environment under the DOE/Environmental Protection Agency/New York State Department of Environmental Conservation Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation and Liability Act Interagency Agreement.			
■ Continue sitewide monitoring and data management activities.			
■ Continue operations and maintenance of Removal Action V on-site groundwater pump and treat systems and Operable Unit IV (Central Steam Facility Oil Spill) air sparging/soil vapor extraction systems.			
■ Continue remedial design and initiate remedial action (soil excavation and disposal) at old Hazardous Waste Management Disposal Area under Operable Unit I.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue remedial design and construction of off-site groundwater treatment system under Operable Unit III, and construction of additional on-site groundwater treatment systems.			
■ Initiate remediation of Peconic River sediments under Operable Unit V.			
CH-BRNLRA	15,263	14,906	14,901

Metrics			
Remedial Actions/Release Sites			
Assessments	4.0	12.0	0.0
Cleanups	8.0	1.0	0.0

CH-BRNLWO / Brookhaven National Laboratory Waste Operations

This project performs all necessary activities to safely and compliantly store, treat, and dispose of waste in quantities as provided in the Metrics table below. These activities are essential for the ongoing Office of Science program mission.

- Safely and compliantly store, treat, and dispose of each waste type in quantities of waste as provided in the metrics table below.
- Continue programmatic supervision and support for activities, including: cost and schedule control; project integration and performance; community relations; regulatory actions; and engineering support.

CH-BRNLWO	5,537	7,418	8,088

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Mixed Low-Level Waste			
Storage (m^3)	11.8	9.1	0.0
Treatment (m^3)	0.0	0.7	0.7
Disposed On-site/Commercial (m^3)	2.6	9.1	15.5
Low-Level Waste			
Storage (m^3)	217.5	141.6	9.6
Treatment (m^3)	233.3	358.9	358.9
Disposed On-site/Commercial (m^3)	118.0	166.6	222.7
Shipped to DOE Disposal Site (m^3)	56.7	283.2	283.2

CH-CHOOPUAB / Princeton Site A/B Payments

Potentially responsible party payments are required to cover DOE's responsibility, as a previous lessee, for a portion of the characterization/remediation costs for Princeton University's Site A/B, in accordance with the New Jersey Department of Environmental Protection/Princeton University Memorandum of Understanding and DOE/Princeton University Memorandum of Agreement.

- Payment of DOE's yearly portion, as a Potentially Responsible Party, of characterization and remediation costs.

CH-CHOOPUAB	153	504	644

Metrics
No quantifiable corporate performance measures are associated with this project.

CH-COPS / Chicago Operations Program Support

This project supports independent reviews, i.e., baseline validation reviews.

CH-COPS	41	597	0

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
CH-PPPLRA / Princeton Plasma Physics Laboratory Remedial Actions			
This project conducts activities to assess and reduce risk at the Princeton Plasma Physics Laboratory Site C/D.			
■ Conduct surveillance and monitoring of the Princeton Plasma Physics Laboratory Site C/D.			
CH-PPPLRA	424	351	273
Metrics			
Remedial Actions/Release Sites			
Assessments	8.0	0.0	0.0
Cleanups	8.0	0.0	0.0
CH-PPPLWO / Princeton Plasma Physics Laboratory Waste Operations			
This project performs all necessary activities to safely and compliantly store, treat, and dispose of waste in quantities as provided in the metrics table below. These activities are essential for the ongoing Office of Science program mission.			
■ Safely and compliantly store, treat, and dispose of each waste type in quantities of waste as provided in the metrics table below.			
■ Continue programmatic supervision and support for activities, including cost and schedule control; project integration and performance; community relations; regulatory actions; and engineering support.			
CH-PPPLWO	2,866	2,992	2,800
Metrics			
Mixed Low-Level Waste			
Treatment (m^3)	0.0	2.0	2.0
Disposed On-site/Commercial (m^3)	0.0	2.0	2.0
Low-Level Waste			
Treatment (m^3)	84.7	379.0	379.0
Shipped to DOE Disposal Site (m^3)	84.7	91.0	91.0
Total, Chicago	45,279	54,063	54,100

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
CH-AMESWO / Ames Waste Operations	
■ Decrease is due to more efficient operations	-46
CH-ANLEDD / Argonne National Laboratory-East Decontamination and Decommissioning Actions	
■ Increase supports characterization activities for decontamination and decommissioning of Zero Power and Juggernaut Reactors	1,166
CH-ANLEPM / Argonne National Laboratory-East Program Management	
■ Increase is to manage the completion of two major decommissioning projects	191
CH-ANLERA / Argonne National Laboratory-East Remedial Actions	
■ Increase is for additional corrective actions activity	856
CH-ANLEWO / Argonne National Laboratory-East Waste Operations	
■ Decrease is due to smaller quantities of low-level disposal and more efficient operations	-622
CH-ANLWRA / Argonne National Laboratory-West Remedial Actions	
■ Decrease is due to fewer activities needed to implement the final remedy	-333
CH-BRNLBYW / Brookhaven National Laboratory Boneyard Waste	
■ Amount is increased to continue boneyard removal activities and to cover disposal of additional waste	1,636
CH-BRNLDD / Brookhaven National Laboratory Decontamination and Decommissioning Actions	
■ Decrease reflects that FY 2000 activities will largely be funded by the DOE Office of Science preparation for the initiation of decommissioning	-2,893
CH-BRNLPM / Brookhaven National Laboratory Program Management	
■ Increase reflects additional support consistent with increased waste activities	144
CH-BRNLRA / Brookhaven National Laboratory Remedial Actions	
■ No significant change	-5
CH-BRNLWO / Brookhaven National Laboratory Waste Operations	
■ Increase is due to increase in quantities of legacy low-level waste and mixed low-level waste disposal	670
CH-CHOOPUAB / Princeton Site A/B Payments	
■ Increase is due to additional anticipated scope	140
CH-COPS / Chicago Operations Program Support	
■ Decrease is due to fewer planned activities	-597

	FY 2000 vs. FY 1999 ($000)
CH-PPPLRA / Princeton Plasma Physics Laboratory Remedial Actions	
■ Decrease is due to less monitoring activity anticipated	-78
CH-PPPLWO / Princeton Plasma Physics Laboratory Waste Operations	
■ Decrease is due to more efficient operations	-192
Total Funding Change, Chicago	37

Idaho

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management (EM) Site/Project Completion program managed by Idaho is to construct a dry storage facility for 145 m^3 of Three Mile Island Unit-2 spent nuclear fuel that is currently in underwater storage at the Idaho National Engineering and Environmental Laboratory's Test Area North. Environmental Management also provides legislatively mandated technical assistance to requesting States and compact regions responsible for commercial low-level radioactive waste through its management of the National Low-Level Waste Program. In addition, this program provided for the deactivation activities associated with two excess reactors and their required surveillance and maintenance.

Program Goal

Throughout the DOE complex, EM is focused on accelerating cleanup and, where possible, completing its mission by FY 2006. At the Idaho National Engineering and Environmental Laboratory, all two of the non-defense elements of the EM mission will be completed within the FY 2006 time frame. The two reactor facilities will be deactivated, the Three Mile Island Unit-2 fuel will be in safe, dry storage, and EM's National Low-Level Waste Program responsibilities will be completed. In FY 1999, the continued monitoring of Three Mile Island-2 fuel and the operation of the Independent Spent Fuel Storage Installation facility will be funded under the Post 2006 Completion-Defense Idaho account.

Program Objective

The objective of the program is to complete construction of the Three Mile Island Unit-2 fuel storage facility in FY 1999, completing the majority of non-defense activities in the Spent Nuclear Fuel Stabilization Program, reducing surveillance and maintenance costs by deactivating two excess reactors, and to continue executing the Department's responsibilities under the National Low-Level Waste Program of technical assistance to states by implementing more efficient and cost-effective approaches through cost-sharing and partnering arrangements.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Initiated construction of independent spent fuel storage installation and complete construction of Three Mile Island Unit-2 independent spent fuel storage installation in support of Idaho Settlement Agreement milestones (FY 1998/FY 1999).
- Completed installation and testing of dewatering system for Three Mile Island spent nuclear fuel (FY 1998).
- Obtain Nuclear Regulatory Commission license approval for the Three Mile Island Unit-2 independent spent fuel storage installation (FY 1999).
- Complete a comprehensive review and analysis of the National Low-level Waste Program to implement in FY 2000 a public/private partnership approach to management of the program (FY 1999).
- For the Power Burst Facility, completed the fuel movement plan for the Power Burst Facility fuels and cleaned up legacy wastes in preparation of facility deactivation (FY 1998).
- For the Materials Test Reactor, completed the Lockheed Martin Idaho Technologies Company Readiness Review in preparation of the Materials Test Reactor fuels move (FY 1998) and will initiate and complete recanning of Materials Test Reactor fuels in preparation of the fuel move to dry storage (FY 1999).
- Meet Idaho Settlement Agreement, Federal Facility Compliance Agreement, Federal Facility Agreement/Consent Order, and other regulatory requirements in a safe and environmentally acceptable manner (FY 2000).
- Commence negotiations with the State of Idaho to develop a mutually agreeable schedule to place Spent Nuclear Fuel into dry interim storage in support of Settlement Agreement, and continue moving Three Mile Island-2 fuel from wet to dry interim storage per Settlement Agreement milestone to complete by June 1, 2001 (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
ID-OIM-110-N / Pre-FY 2007 Surplus Facility Deactivation Project - Non-Defense	627	4,638	763	-3,875	-83.5%
ID-OIM-112-N / Pre-FY 2007 Idaho Engineering and Environmental Laboratory Surveillance and Maintenance - Non-Defense	1,492	1,303	1,600	297	22.8%
ID-SNF-104-N / Constructed New Facilities - Non-Defense	751	0	3,500	3,500	>999.9%
ID-WM-102 / National Low-Level Waste Program	4,021	4,086	3,345	-741	-18.1%
ID-WV-103 / Spent Nuclear Fuel (West Valley)	610	0	0	0	0.0%
Total, Idaho	7,501	10,027	9,208	-819	-8.2%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Idaho National Engineering and Environmental Laboratory	7,501	10,027	9,208	-819	-8.2%
Total, Idaho	7,501	10,027	9,208	-819	-8.2%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Metrics captured under Defense Appropriation			

Site Description

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory, established as the National Reactor Testing Station in 1949, occupies 890 square miles in the Snake River Plain of Southeastern Idaho. Over the years, 52 reactors have been constructed and operated at the Idaho National Engineering and Environmental Laboratory. Three of these reactor facilities (Power Burst Facility, Advanced and Coupled Fast Reactivity Measurement Facility, and Material Test Reactor Canal) are managed by the Office of Environmental Management.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
The Idaho site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope Planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. For most projects the Army Corps of Engineers performed an independent review of the Environment Management baseline at the Idaho National Engineering and Environmental Laboratory. Funds requested are appropriate to perform activities based on historical level of effort.			
ID-OIM-110-N / Pre-FY 2007 Surplus Facility Deactivation Project - Non-Defense			
This project provides for Materials Test Reactor Canal fuel removal deactivation, and Power Burst Facility fuel removal and deactivation ■ Complete Materials Test Reactor Canal fuel removal deactivation. ■ Initiate Power Burst Facility fuel removal and deactivation.			
ID-OIM-110-N	627	4,638	763
Metrics Metrics captured under ID-OIM-110 in the Defense Site/Project Completion Account			
ID-OIM-112-N / Pre-FY 2007 Idaho Engineering and Environmental Laboratory Surveillance and Maintenance - Non-Defense			
This project maintains the Power Burst Facility/Materials Test Reactor surplus reactors in a safe, secure, and environmentally sound condition until deactivation is complete. ■ Continue surveillance and maintenance at the Power Burst Facility and Materials Test Reactor.			
ID-OIM-112-N	1,492	1,303	1,600

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Metrics
No quantifiable corporate performance measures are associated with this project.

ID-SNF-104-N / Constructed New Facilities - Non-Defense (93-E-900)

The Spent Nuclear Fuel Stabilization Program at the Idaho National Engineering and Environmental Laboratory is focused on constructing a new facility, the Independent Spent Fuel Storage Installation (93-E-900, Long-Term Storage of Three Mile Island-2 Fuel), that will allow the Three Mile Island Unit-2 fuel to be removed from wet storage in the Test Area North and placed in stable, dry interim storage. Completion of this project directly supports Settlement Agreement milestone #E-7 which requires completion of construction by December 31, 1998, initiating Three Mile Island-2 fuel movement into a dry storage facility by March 31, 1999 and completing it by June 1, 2001. In addition, this project eliminates vulnerabilities of underwater spent nuclear fuel storage at Test Area North identified in the October 1993, DOE-Environmental Health Spent Nuclear Fuel Storage Vulnerability Report.

The Three Mile Island-2 spent nuclear fuel inventory at the Idaho National Engineering and Environmental Laboratory (145 m^3) will be moved to the new facility by FY 2001 using funds requested through the Defense Appropriation

- Obtain Three Mile Island-2 Independent Spent Fuel Storage Installation license amendment to accommodate Loss of Fluid Test and commercial fuels also stored at the Test Area North underwater facility.
- Provide equipment for transfer of the Loss of Fluid Test and Commercial Spent Fuel Storage from Test Area North pool to dry storage.
- Continues funding for construction of the Long-Term Storage of Three-Mile Island-2, 93-E-900 Included in the funding totals for this PBS are $397,000 for FY 1998, $0 for FY 1999; and $2,500,000 for FY 2000.

ID-SNF-104-N	751	0	3,500

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics No quantifiable corporate performance measures are associated with this project.			
ID-WM-102 / National Low-Level Waste Program Program Management activities provide for technical support to the States and compact regions, and address DOE's Greater-Than-Class-C Low-Level Waste responsibilities. ■ Continue to maintain data bases for tracking and reporting low-level waste disposal information. ■ Continue to support DOE-Headquarters in meeting reporting responsibilities to Congress and public inquiry. ■ Implement more cost sharing and partnering arrangements to continue quality technical assistance to states as mandated by Public Law 99-240.			
ID-WM-102	4,021	4,086	3,345
Metrics Page 822 Page 823 No quantifiable corporate performance measures are associated with this project.			
ID-WM-103 / Spent Nuclear Fuel (West Valley) ■ FY 1998 funding provided from Ohio/West Valley for spent nuclear fuel storage at Idaho. No FY 2000 funding.			
ID-WM-103	610	0	0
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Idaho	7,501	10,027	9,208

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs FY 1999 ($000)
ID-OIM-110-N / Pre-FY 2007 Surplus Facility Deactivation Project - Non-Defense	
■ Decrease reflects completion of recanning of the Materials Test Reactor fuels and completion of deactivation planning at the Power Burst Facility	-3,875
ID-OIM-112-N / Pre-FY 2007 Idaho Engineering and Environmental Laboratory Surveillance and Maintenance - Non-Defense	
■ Increase reflects transfer of the Materials Test Reactor from deactivation to surveillance and maintenance activities	297
ID-SNF-104-N / Constructed New Facilities - Non Defense (93-E-900)	
■ Bankruptcy of a key subcontractor has delayed the project resulting in additional project costs, and Nuclear Regulatory Commission licensing costs are more than expected	3,500
ID-WM-102 / National Low-Level Waste Program	
■ Decrease reflects implementation of public/private partnership management of the program for greater efficiencies	-741
Total Funding Change, Idaho	-819

Major Issues

Idaho's budget request is compliance based and only minimal mortgage reduction activities will be funded in the FY 2000 request, requiring a continued high-level of surveillance and maintenance (costs) for abandoned (contaminated) facilities.

Oakland

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management (EM) Site/Project Completion program managed through the Oakland Operations Office is to plan and implement remediation and waste treatment, storage, and disposal activities at seven sites. These sites include Lawrence Berkeley National Laboratory, the Energy Technology Engineering Center, the General Electric Vallecitos Nuclear Center, the General Atomics facility, the Laboratory for Energy-Related Health Research, and the Stanford Linear Accelerator Center. The Non-Defense account also includes the administration of grants at the Oakland Operations Office. The Lawrence Berkeley National Laboratory and the Stanford Linear Accelerator Center continue to have operating facilities under other DOE programs such as the Office of Science, while the other sites are being returned to the landowners.

Program Goal

EM Programmatic goals are to have cleanup completed at these sites by 2006; and to ensure operations, facilities and contaminated sites pose no undue risk to the public, worker health and safety; to maintain compliance with applicable environmental laws; and to manage risks associated with current and prior DOE operations at these sites.

Program Objectives

The program objective is to assess, remediate, decontaminate and decommission contaminated sites and facilities; characterize, treat, minimize, store, and dispose of hazardous and radioactive waste; and develop, demonstrate, test and evaluate new cleanup technologies. These program activities are conducted taking an integrated approach to assessing work and meeting schedules, while balancing risk, mortgage reduction, compliance, cost efficiencies, stakeholder input, and implementation of enhanced performance mechanisms. Financial responsibility for newly generated waste will be returned to the generating DOE program by FY 2003. All of the Oakland Operations Office Non-Defense EM funded sites will be cleaned up and all legacy waste will be characterized and shipped off-site by FY 2006. Long-term surveillance and maintenance of implemented remedial actions (e.g., pump and treat facilities) will be assumed by the landlord programs post FY 2006.

The Oakland Operations Office has plans for the use of innovative technologies at several of its installations. For example, a new remediation technology using water-vapor and nitrogen was chosen for cleaning the sodium loop/systems at the Energy Technology Engineering Center. This technology was selected because it was proven to be a cost-effective method for the removal of sodium and will not

generate hazardous waste. Innovative technologies are also being considered at the Energy Technology Engineering Center for testing ground water remediation. These technologies include anaerobic bio-remediation, steam injection, ozone injection, bio-sparging, moving bed liquid phase carbon adsorption and high vacuum dual phase extraction. In general, the technology selected must be cost-effective to implement and have no adverse impact on neighboring property. Decreased contamination migration during the pilot tests is considered a goal. Technologies being considered at the Laboratory for Energy-Related Health Research will allow for recycling and reuse of material and waste from past decontamination and decommissioning operations and characterization activities. When appropriate, either microencapsulation for lead, waste stabilization or compaction will be used.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- Continue environmental restoration activities, i.e., groundwater monitoring, treatment system operation, removal actions, decontamination and decommissioning at Lawrence Berkeley National Laboratory, Stanford Linear Accelerator Center, the Laboratory for Energy-Related Health, and the Energy Technology Engineering Center, to ensure compliance with Federal Facility Agreements and State orders and continue to meet commitments in the *Accelerating Cleanup: Paths to Closure* (FY 2000).
- Shipped about 60 cubic meters of mixed low-level waste to Envirocare; 850 cubic meters of low-level waste to Hanford; and 882 cubic meters of low-level waste to the Nevada Test Site from the Energy Technology Engineering Center (FY 1998).
- Completed decontamination and decommissioning of Liquid Metal Development Lab.-1, and Building 104, a radioactive facility at the Energy Technology Engineering Center (FY 1998).
- Dispose of about 1,000 cubic meters of low-level waste from the Energy Technology Engineering Center (FY 1999).
- Complete assessment activities for the SNAP-8 Groundwater Prototype Test Facility and the H-1 Heater and continue pipe removal and complete bulk sodium removal from the Small Component Test Installation at the Energy Technology Engineering Center (FY 1999).
- Completed 13 release site assessments at the Laboratory for Energy-Related Health Research (FY 1998).
- Removed contaminated soil from the southwest trenches at the Laboratory for Energy-Related Health Research (FY 1998).

- Complete Engineering Evaluation/Cost Analysis and Remedial Action workplan and begin removal actions at Sr-90/Ra-226 areas and complete removal action at the Southwest Trenches Area at the Laboratory for Energy-Related Health Research (FY 1999).
- Completed interim removal action at the Plating Shop and completed Remedial Investigation/Feasibility Study activities at the former Solvent Underground Tank Area and characterization of the master substation at the Stanford Linear Accelerator Center (FY 1998).
- Complete interim removal action at the Lower Salvage Yard and Remedial Investigation/Feasibility Study activities at the Monitoring Well 24 area Plating Shop at the Stanford Linear Accelerator Center (FY 1999).
- Disposed of 60 cubic meters of low-level waste from Lawrence Berkeley National Laboratory (FY 1998).
- Continue to prepare Lawrence Berkeley National Laboratory mixed waste for shipment to Idaho National Engineering and Environmental Laboratory and begin to work-off low-level waste formerly stored at the old Hazardous Waste Management Facility (FY 1999).
- Obtained approval from Hanford and shipped 0.5 cubic meters of low-level biowaste from Laboratory for Energy Related Health (FY 1998); continue shipments in FY 1999.
- Completed closure of Hazardous Waste Handling Facility at Lawrence Berkeley National Laboratory (FY 1998).
- Perform interim corrective measures at Building 17 and 52 by removing polychlorinated biphenyl contaminated soil at Lawrence Berkeley National Laboratory (FY 1999).
- Completed Hot Cell Facility decontamination activities at General Atomics (FY 1998).
- Complete the dismantlement of the Hot Cell Facility and soil remediation activities at General Atomics (FY 1999).
- Complete cleanup activities at the General Atomics Site (FY 2000).
- Initiate characterization activities for decontamination and decommissioning of General Electric Hot Cell (FY 1999).
- Continue storage, treatment, and some off-site disposal of waste (low-level, mixed low-level, and transuranic) at the Lawrence Berkeley National Laboratory, the Laboratory for Energy-Related Health Research, and the Energy Technology Engineering Center (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OK-003 / Lawrence Berkeley National Laboratory Soils and Groundwater (Environmental Restoration)	2,833	3,500	3,500	0	0.0%
OK-004 / Lawrence Berkeley National Laboratory Hazardous Waste Handling Facility Closure (Environmental Restoration)	657	0	0	0	0.0%
OK-005 / Stanford Linear Accelerator Center (Environmental Restoration)	1,006	1,000	1,400	400	40.0%
OAK-007 / Energy Technology Engineering Center Remediation	9,743	8,352	10,248	1,896	22.7%
OAK-009 / Energy Technology Engineering Center Landlord	4,000	5,578	3,650	-1,928	-34.6%
OK-010 / Laboratory for Energy-Related Health Research Environmental Restoration	5,580	3,030	3,000	-30	-1.0%
OK-012 / Hot Cell Facility Decontamination and Decommissioning at General Atomics	4,280	2,030	1,100	-930	-45.8%
OK-013 / General Electric Decontamination and Decommissioning (Environmental Restoration)	0	313	500	187	59.7%
OK-014 / Laboratory for Energy-Related Health Research Waste Management	1,222	1,359	863	-496	-36.5%
OK-015 / Lawrence Berkeley National Laboratory Legacy Waste	0	1,228	1,498	270	22.0%
OK-016 / Lawrence Berkeley National Laboratory Newly Generated Wastes	5,775	5,940	6,100	160	2.7%
OK-040 / Program Management and State Grants	87	0	300	300	>999.9%
OK-042 / Energy Technology Engineering Center Waste Management	3,882	2,564	3,500	936	36.5%
Total, Oakland	39,065	34,894	35,659	765	2.2%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Energy Technology Engineering Center/Santa Susana Field Laboratory (CA)	17,625	16,494	17,398	904	5.5%
General Atomics (CA)	4,280	2,030	1,100	-930	-45.8%
General Electric (CA)	0	313	500	187	59.7%
Lawrence Berkeley National Laboratory (CA)	9,265	10,668	11,098	430	4.0%
Oakland Operations Office (CA)	87	0	300	300	>999.9%
Stanford Linear Accelerator Center (CA)	1,006	1,000	1,400	400	40.0%
U.C. Davis / Laboratory for Energy-Related Health Research (CA)	6,802	4,389	3,863	-526	-12.0%
Total, Oakland	39,065	34,894	35,659	765	2.2%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Action/Release Site			
Assessments	35.0	8.0	16.0
Cleanups	10.0	3.0	9.0
Facility Decommissioning			
Assessments	4.0	2.0	0.0
Cleanups	5.0	1.0	2.0
Transuranic Waste			
Storage (m^3)	9.0	9.0	6.9
Treatment (m^3)	0.0	0.0	2.1
Shipped to DOE Disposal Site (m^3)	0.0	0.0	2.1
Mixed Low-Level Waste			
Storage (m^3)	39.8	173.8	256.8
Treatment (m^3)	16.5	1.3	116.0
Disposed On-site/Commercial (m^3)	60.0	54.1	0.1
Shipped to DOE Disposal Site (m^3)	3.5	1.0	0.0
Low Level Waste			
Storage (m^3)	4,446.0	4,510.0	3,429.0
Treatment (m^3)	72.0	18.0	10.0
Disposed On-site/Commercial (m^3)	214.1	1,446.0	242.0
Shipped to DOE Disposal Site (m^3)	2,525.5	1,290.0	1,410.0
Hazardous Waste			
Disposal On-site/Commercial (MT)	294.0	322.0	0.0

Site Description

Lawrence Berkeley National Laboratory

The 130-acre Lawrence Berkeley National Laboratory site is located adjacent to the University of California in Berkeley, California Remediation activities at the Lawrence Berkeley National Laboratory focus on characterization and remediation of contaminated soil and ground water and the closure of the old Hazardous Waste Handling Facility. Currently, there are 163 release sites and one facility on site, of which 125 release sites and the facility will be completed by FY 2000. The waste management activities provide compliant storage, treatment, and off-site disposal of both legacy and currently generated hazardous and radioactive waste. Disposal of a backlog of non-compactible low-level waste to Hanford will begin in FY 1999. Environmental restoration activities will be completed and the financial responsibility for newly generated waste will be returned to the generating DOE program by FY 2003.

Energy Technology Engineering Center

The Energy Technology Engineering Center is a DOE facility located on 90 acres of leased land from Boeing North American Corporation in Simi Valley, California. The environmental restoration activities at the Energy Technology Engineering Center are to remediate contaminated ground water, complete decontamination and decommissioning of 12 remaining radiological facilities, deactivate and cleanup of 5 remaining sodium facilities, provide landlord functions, complete the 6 remaining release sites, and perform waste characterization and off-site disposal by FY 2005. Overall site closure will be achieved by FY 2006.

General Electric

The General Electric Site is a privately-owned site located near Pleasanton, California. Activities are focused on cleanup of a High Level Hot Cell and irradiated reactor components and a glove box enclosure. In FY 1998, surveillance, maintenance and characterization activities will be initiated. The General Electric site is comprised of 2 facilities, and cleanup will be completed by FY 2006. Once the facility is completed, it will be returned to the landowners for future use.

General Atomics

The General Atomic site is privately-owned and located near San Diego, California. General Atomics has maintained and operated a Hot Cell Facility for over 30 years to conduct both Government and commercially funded nuclear research and development. Department of Energy efforts are focused on cleanup of the Hot Cell Facility and surrounding contaminated soils. The General Atomics site is comprised of 1 facility and 2 release sites, all of which will be completed by FY 2000. Cleanup

activities will be finalized with the off-site removal of legacy waste and return of the site to the landowners for unrestricted future use.

Laboratory for Energy-Related Health Research

The Laboratory for Energy-Related Health Research site is located at the University of California, Davis. Research at the laboratory originally focused on the health effects from chronic exposure to radionuclides using animal subjects to simulate radiation effects on humans. DOE terminated the research program and closed the Laboratory in 1988. Environmental restoration activities are directed toward cleaning up DOE areas of site contamination for release to the University of California, Davis without radiological restrictions. The Laboratory for Energy-Related Health Research site is comprised of 17 release sites, of which 8 will be completed by FY 2000; and 8 facilities, of which 7 are to be completed as of FY 2000. Waste characterization and off-site disposal and overall site cleanup will be completed by FY 2002.

Stanford Linear Accelerator Center

The Stanford Linear Accelerator Center site is a 426-acre site located at Stanford University in California. It is managed under contract between DOE and Stanford University where theoretical research in high-energy particle physics is conducted. Remediation efforts focus on the cleanup of polychlorinated biphenyls contaminated soil sites and several solvent contaminated ground water sites. The Stanford Linear Accelerator Center site is comprised of 14 release sites, all of which will be completed in FY 2002. Responsibility for waste management activities was transferred to Energy Research, the generating DOE program, in FY 1998.

Oakland Operations Office

The Oakland Operations Office and the State of California have an agreed to statement of work for grant funds. Oakland Operations Office awards and manages grants provided to the state for oversight activities which include, participation in meetings, review of documents, and involvement with the public.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The Lawrence Berkeley National Laboratory, Stanford Linear Accelerator Center, and Energy Technology Engineering Center sites are managed through performance based contracts to assure the most cost-effective services to the Government. The Laboratory for Energy-Related Health Research site is managed through an incentivized contract. The scope planned for FY 2000 at these sites has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. The project work at these sites have had an independent cost review of the scope (e.g. the Corps of Engineers and Oakland's in-house non-programmatic cost estimating staff have reviewed the Energy Technology Engineering Center scope, and this staff has also reviewed the Laboratory for Energy-Related Health Research scope and cost). The funds requested for FY 2000 for these sites are appropriate to perform the activities based on a historical level of effort costs.			
Page 831 Page 831 **OK-003 / Lawrence Berkeley National Laboratory Soils and Groundwater (Environmental Restoration)** The mission of this project is to investigate and cleanup all release sites of hazardous and/or radioactive waste in soil and groundwater that may have occurred at the site. All remediation activities will be conducted using Resource Conservation and Recovery Act guidance and State regulations. ■ Continue monitoring, maintenance, and operations of groundwater treatment systems. ■ Prepare corrective measures study and begin excavation of approximately 100 cubic yards of contaminated soil at seven locations.			
OK-003	2,833	3,500	3,500

Metrics			
Remedial Actions/Release Sites			
Assessments	20.0	7.0	12.0
Cleanups	9.0	0.0	1.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OK-004 / Lawrence Berkeley National Laboratory Hazardous Waste Handling Facility Closure (Environmental Restoration)			
This project provided for the closure of the old Hazardous Waste Handling Facility recently replaced by a new facility constructed by the waste management program. The closure was performed in accordance with Lawrence Berkeley National Laboratory's site Resource Conservation and Recovery Act Part B Permit Closure Plan.			
■ Project completed in FY 1998.			
OK-004	657	0	0
Metrics			
Facility Decommissioning			
Assessments	1.0	0.0	0.0
Cleanups	1.0	0.0	0.0
OK-005 / Stanford Linear Accelerator Center (Environmental Restoration)			
The mission of this project is to clean up contaminated soils and groundwater using Comprehensive Environmental Response, Compensation and Liability Act guidance. The Stanford Linear Accelerator Center is an operating facility which is being operated by Stanford University under a contract with DOE to conduct theoretical research in high-energy particle physics. The DOE Office of Science will be responsible for the groundwater monitoring system beyond Fiscal Year 2002.			
■ Completion of remediation of the Lower Salvage Yard and Monitoring Well 24 Area.			
■ Continue groundwater monitoring.			
OK-005	1,006	1,000	1,400
Metrics			
Remedial Actions/Release Sites			
Assessments	2.0	0.0	2.0
Cleanups	0.0	1.0	2.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OK-007 / Energy Technology Engineering Center Remediation			
This project accomplishes (1) cleanup of contaminated release sites; (2) decontamination and decommissioning of radioactive, and chemically contaminated facilities at the Energy Technology Engineering Center for eventual release to Boeing; and (3) remediation of contaminated groundwater.			
■ Complete decontamination and decommissioning activities at the H-1 Heater facility.			
■ Continue operating groundwater monitoring system.			
■ Continue Resource Conservation and Recovery Act corrective measures workplan activities.			
■ Complete decontamination and decommissioning activities at the SNAP-8 facility.			
OK-007	9,743	8,352	10,248

Metrics			
Remedial Actions/Release Sites			
Assessments	0.0	0.0	1.0
Facility Decommissioning			
Assessments	3.0	2.0	0.0
Cleanups	4.0	0.0	2.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OAK-009 / Energy Technology Engineering Center Landlord			
This project accomplishes all infrastructure management and surveillance and maintenance activities at the Energy Technology Engineering Center. Activities include: (1) landlord general support, such as rent, environmental support, permits, security and fire protection; (2) surveillance and maintenance (laboratory, facilities, records, and other support service). Landlord responsibilities for the Energy Technology Engineering Center were transferred to EM in FY 1997 from Nuclear Energy.			
■ All infrastructure management, and surveillance and maintenance activities.			
■ Complete divestment of 70 percent of the personal property (equipment)			
■ Complete turnover of 50 percent of facilities (real property) to Rocketdyne, the owner of the site.			
OAK-009	4,000	5,578	3,650
Metrics This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			
OK-010 / Laboratory for Energy-Related Health Research Environmental Restoration			
This project accomplishes; (1) decontamination and decommissioning of radioactive and chemically contaminated facilities; (2) removal of on-site radioactive sources; (3) remediation and/or removal of soil contamination at DOE burial areas, leach fields, and outdoor dog pens; (4) closure or removal of underground tanks; (5) verification of cleanup completion; and (6) post closure monitoring as required by Comprehensive Environmental Response, Compensation and Liability Act for National Priority List sites. The cleaned facilities and land will be returned to the University of California, Davis for future use.			
■ Completion of removal action at SR-90/Ra-226 Areas and at the Western dog pens.			
OK-010	5,580	3,030	3,000

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Remedial Actions/Release Sites			
Assessments	13.0	1.0	1.0
Cleanups	0.0	1.0	6.0

OK-012 /-Hot Cell Facility Decontamination and Decommissioning at General Atomics

The mission of this project is to remove radiological and hazardous contamination from the Hot Cell Facility leading to the release of the site to the landowner for future use.

- Complete decontamination and decommissioning activities at the Hot Laboratory.
- Interim on-site storage of irradiated fuel material at General Atomics until future shipment to Idaho National Engineering Laboratory can be accommodated.

OK-012	4,280	2,030	1,100

Metrics			
Remedial Actions/Release Sites			
Cleanups	1.0	1.0	0.0
Facility Decommissioning			
Cleanups	0.0	1.0	0.0
Mixed Low-Level Waste			
Storage (m^3)	13.3	0.3	0.0
Treatment (m^3)	13.0	0.3	0.0
Low Level Waste			
Storage (m^3)	906.0	390.0	0.0
Treatment (m^3)	42.0	8.0	0.0
Disposed On-site/Commercial (m^3)	0.0	540.0	0.0
Shipped to DOE Disposal Site (m^3)	793.0	390.0	0.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OK-013 / General Electric Decontamination and Decommissioning (Environmental Restoration)			
This project allows for the decontamination of Hot Cell #4 located in the Radioactive Materials Laboratory in Building 102 at the General Electric Vallecitos site near Pleasanton, California.			
■ Complete maintenance and characterization, begin decontamination and decommissioning of glove box in the Hot Cell			
OK-013	0	313	500

Metrics
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.

OK-014 / Laboratory for Energy-Related Health Research Waste Management

The mission of this project to characterize, treat, transfer and/or dispose of remaining environmental restoration waste.

- Complete waste management State and Federal reports and documents, manage storage areas, conduct radiation surveys, negotiate contracts for disposal of materials and waste, prepare waste plans and off-site shipments for material and wastes.

OK-014	1,222	1,359	863

Metrics			
Mixed Low-Level Waste			
Storage (m^3)	0.0	39.0	0.0
Disposed On-site/Commercial (m^3)	0.0	39.0	0.0
Low-Level Waste			
Storage (m^3)	1,809.0	2,450.0	2,000.0
Disposed On-site/Commercial (m^3)	153.5	764.0	200.0
Shipped to DOE Disposal Site (m^3)	0.5	0.0	0.0
Hazardous Waste			
Storage (MT)	286.0	322.0	0.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OK-015 / Lawrence Berkeley National Laboratory Legacy Waste			
The mission of this project is to reduce inventories of previously generated hazardous, radioactive and mixed waste that have been generated by DOE programs at Lawrence Berkeley National Laboratory for which the Environmental Management program is responsible. Activities in this project support the treatment, storage, and disposition of legacy waste.			
■ Waste Management activities continue to prepare for shipment of waste to Idaho National Engineering and Environmental Laboratory.			
■ Continue storage treatment and disposal activities to reduce waste from Building 75 lower yard.			
OK-015	0	1,228	1,498
Metrics			
Mixed Low-Level Waste			
Storage (m^3)	0.0	4.0	2.7
Disposed On-site/Commercial (m^3)	0.0	0.1	0.1
Low-Level Waste			
Storage (m^3)	0.0	36.0	9.0
Disposed On-site/Commercial (m^3)	0.0	27.0	27.0
OK-016 / Lawrence Berkeley National Laboratory Newly Generated Wastes			
Activities in this project are required to treat, store, transport, and dispose of newly generated hazardous, radioactive transuranic and mixed waste. Limited treatment of low-level waste and mixed waste is done on site. Packaging and shipping of hazardous waste, low-level waste and mixed waste in accordance with off-site Treatment, Storage, Disposal Facility requirements is the primary work performed in this project.			
■ Continue routine shipments of newly generated tritium and compactible low-level waste.			
■ Implement pollution prevention techniques and practices resulting in enhanced performance and reduced project costs.			
OK-016	5,775	5,940	6,100

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Transuranic Waste			
Storage (m^3)	1.0	1.0	1.0
Mixed Low-Level Waste			
Storage (m^3)	17.5	9.5	12.3
Treatment (m^3)	3.5	1.0	1.0
Shipped to DOE Disposal Site (m^3)	3.5	0.0	0.0
Low-Level Waste			
Storage (m^3)	79.0	134.0	134.0
Treatment (m^3)	30.0	10.0	10.0
Disposed On-site/Commercial (m^3)	60.6	15.0	15.0
Hazardous Waste			
Disposed On-site/Commercial (MT)	8.0	0.0	0.0

OK-040 / Program Management and State Grants

This project provides funding for the Oakland Operations Office to support and manage state grants.

- Continue to provide grant funds in support of state oversight activities.

OK-040	87	0	300

Metrics
No quantifiable corporate performance measures are associated with this project.

OK-042 / Energy Technology Engineering Center Waste Management

This project accomplishes all necessary activities to manage and implement a waste management program for ongoing and planned environmental cleanup activities at the Energy Technology Engineering Center site. This project funds two existing facilities that will provide centralized waste management of hazardous, radioactive and mixed waste generated from environmental cleanup activities and transportation of wastes for its final disposition. Funded activities include: (1) operation of the Hazardous Waste Management Facility; (2) operation of the Radioactive Material Handling Facility; and (3) Resource Conservation and Recovery Act closure of these facilities upon the end of their useful life (by the end of FY 2006).

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Continue operation of the Radioactive Materials Handling Facility and the Hazardous Waste Management Facility.			
OK-042	3,882	2,564	3,500
Metrics			
Transuranic Waste			
Storage (m^3)	8.0	8.0	5.9
Treatment (m^3)	0.0	0.0	2.1
Shipped to DOE Disposal Off-site (m^3)	0.0	0.0	2.1
Mixed Low-Level Waste			
Storage (m^3)	9.0	121.0	241.8
Treatment (m^3)	0.0	0.0	115.0
Disposed On-site/Commercial (m^3)	60.0	15.0	0.0
Shipped to DOE Disposal Off-site (m^3)	0.0	1.0	0.0
Low-Level Waste			
Storage (m^3)	1,652.0	1,500.0	1,286.0
Disposed On-site/Commercial (m^3)	0.0	100.0	0.0
Shipped to DOE Disposal Off-site (m^3)	1,732.0	900.0	1,410.0
Total, Oakland	39,065	34,894	35,659

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OK-005 / Stanford Linear Accelerator Center (Environmental Restoration)	
■ Increased funding to support completion of environmental restoration activities at the Stanford Linear Accelerator Center site by FY 2002	400
OAK-007 / Energy Technology Engineering Center Remediation	
■ Increase in funds supports completion of decontamination and decommissioning of foundations at the Sodium Component Test Loop and Liquid Materials Development Laboratories 1 and 2 to maintain planned site closure by FY 2006. These activities were not originally planned	1,896
OAK-009 / Energy Technology Engineering Center Landlord	
■ The decrease in funding is due to fewer facilities needing infrastructure management and surveillance and maintenance and major divestment actions	-1,928

	FY 2000 vs. FY 1999 ($000)
OK-010 / Laboratory for Energy-Related Health Research Environmental Restoration	
■ Requested funding level is adequate to allow performance of activities necessary to complete project in FY 2002 as scheduled. No significant change	-30
OK-012 / Hot Cell Facility Decontamination and Decommissioning at General Atomics	
■ Decrease reflects rampdown of activities toward project completion in FY 2000	-930
OK-013 / General Electric Decontamination and Decommissioning (Environmental Restoration)	
■ Increased cost for surveillance and maintenance of facility	187
OK-014 / Laboratory for Energy-Related Health Research Waste Management	-
■ Decrease in funding is related to the reduced volume of environmental mixed low-level waste estimated to be processed and stored	-496
OK-015 / Lawrence Berkeley National Laboratory Legacy Waste	
■ Slight increase in low-level waste treatment cost and mixed low-level waste storage costs for legacy waste	270
OK-016 / Lawrence Berkeley National Laboratory Newly Generated Wastes	
■ Slight increase in low-level waste treatment cost and mixed low-level waste storage cost for newly generated wastes and to fund pollution prevention activities	160
OK-040 / Program Management and State Grants	
■ Increased funding for the Oakland Operations Office is needed to support and manage the state grants associated with regulatory, oversight and participation	300
OK-042 / Energy Technology Engineering Center Waste Management	
■ Increase in costs due to shipping of low-level waste from decontamination and decommissioning activities and other soil shipments; and work on the Resource Conservation and Recovery Act closure of the Hazardous Waste Materials Facility (Building 133) at the Energy Technology Engineering Center	936
Total Funding Change, Oakland	765

Richland

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management Site/Project Completion program, managed by the Richland Operations Office, is cleanout and surveillance and maintenance activities for buildings formerly used for Nuclear Energy research and development.

Program Goal

The goal is to transition former Nuclear Energy facilities to safe, compliant, long-term, economic, interim condition pending ultimate disposition.

Program Objective

The objective is to perform cleanout and stabilization activities to put these facilities into a low-cost surveillance and maintenance condition as soon as possible.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

No significant change.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
RL-TP08 / 324/327 Facility Transition Project	13,200	0	0	0	0.0%
RL-TP11 / Advanced Reactors Transition	5,853	1,863	1,418	-445	-23.9%
Total, Richland	19,053	1,863	1,418	-445	-23.9%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Hanford	19,053	1,863	1,418	-445	-23.9%
Total, Richland	19,053	1,863	1,418	-445	-23.9%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Spent Nuclear Fuel			
Stabilized During the Period (m^3)	0.3	0.0	0.0
Stabilized During the Period (MTHM)	0.2	0.0	0.0

Site Description

Hanford

The Richland Operations Office manages the Hanford site, which is located on 560 square miles (1,450 square kilometers) in southeastern Washington Hanford was among the first facilities constructed by the Manhattan Project for the production of plutonium for national defense Historically, the Hanford mission was plutonium production, reactor and processing operations, and research related to advanced reactors, energy technologies, and basic sciences. All production activities ceased in 1989, leaving a legacy of significant quantities of hazardous and nuclear waste.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The site is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost-effective services to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the Accelerating Cleanup: Paths to Closure. All of the projects included in this section of the budget have had an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities based on estimated project progress and accumulated cost management success.			
RL-TP08 / 324/327 Facility Transition Project			
This project provides for planning, deactivation, and maintenance of a minimum safe status for the 324/327 facilities, clean out of the B-Cell in the 324 building, and legacy waste removal from the 327 building.			
■ In FY 2000 there is no activity in the Non-Defense Site/Project Completion budget for this project. Funding is included under the Defense Site/Project Completion budget, beginning in FY 1999.			
RL-TP08	13,200	0	0

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
RL-TP11			
The purpose of this project is to safely transition the Plutonium Recycle Test Reactor/309 Building, the Nuclear Energy Legacies, and the Fast Flux Test Facility/Fuels and Materials Examination Facility (FY 1998 only) to a deactivated state This includes minimum safe surveillance and maintenance activities necessary for maintaining facility safety basis.			
■ Continue minimum safe surveillance and maintenance activities necessary for maintaining facility safety bases.			
RL-TP11	5,853	1,863	1,418
Metrics			
Spent Nuclear Fuel			
Stabilized During the Period (m^3)	0.3	0.0	0.0
Stabilized During the Period (MTHM)	0.2	0.0	0.0
Total, Richland	19,053	1,863	1,418

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
RL-TP11 / Advanced Reactors Transition	
■ Decrease reflects deferral of further facility deactivation due to budget constraints	-445
Total Funding Change, Richland	-445

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
General Plant Projects	890	263	75	-188	-71.5%
Accelerator Improvement Projects	0	0	0	0	0%
Capital Equipment	169	148	289	141	95.3%
Total, Capital Operating Expense	1,059	411	364	-47	-11.4%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Approp-riations	FY 1998	FY 1999	FY 2000	Unapprop-riated Balance
93-E-900 Long-Term Storage of TMI-2 Fuel, INEEL	28,000	25,103	397	0	2,500	0
Total, Construction		25,103	397	0	2,500	0

93-E-900 Long Term Storage of TMI-2 Fuel, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho (ID-SNF-104-N)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin)

Significant Changes

Scope of this project has been reducted by removing the Transport Equipment and aligning this work with Defense Operating funds for fuel movement (documented funding determination).

The license application process has delayed construction and changed some technical requirements. In addition, a primary subcontractor went bankrupt causing significant delays resulting in additional subcontractor and contractor costs. As a result, the total estimated cost and total project cost have increased.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1993 Budget Request *(Preliminary Estimate)*	1Q 1993	1Q 1994	2Q 1993	4Q 1997	20,600	24,200
FY 1994 Budget Request *(Preliminary Estimate)*	1Q 1993	1Q 1994	2Q 1993	4Q 1997	20,600	24,200
FY 1995 Budget Request *(Preliminary Estimate)*	1Q 1993	1Q 1994	2Q 1993	4Q 1997	20,600	24,200
FY 1996 Budget Request *(Preliminary Estimate)*	1Q 1993	1Q 1994	2Q 1993	4Q 1997	20,600	24,200
FY 1997 Budget Request *(Title I Baseline)*	1Q 1993	Design/Build/ Turnkey	4Q 1995	4Q 1997	25,500	30,000
FY 1998 Budget Request *(Title I Baseline)*	1Q 1993	Design/Build/ Turnkey	4Q 1995	4Q 1998	25,500	30,000
FY 1999 Budget Request *(Title I Baseline)*	No Request	No Request	No Request	No Request	No Request	No Request
FY 2000 Budget Request *(Current Baseline)*	1Q 1993	Design/Build/ Turnkey	1Q 1996	4Q 2001	28,000	33,500

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Cost
Design/Construction			
1993	2,720	2,720	253
1994	6,854 [a]	6,854 [a]	982
1995	4,910	4,910	317
1996	4,048	4,048	2,924
1997	6,571	6,571	1,941
1998	397	397	4,061
1999	0	0	10,434
2000	2,500	2,500	1,909
2001	0	0	5,179

3. Project Description, Justification and Scope

This project provides dry storage for reactor fuel bearing materials currently in the Test Area North (TAN) Hot Shop Pool including the Three Mile Island-2 (TMI-2) core debris (packaged in canisters). The Three Mile Island-2 core debris canisters will be moved to an interim storage system at Idaho Nuclear Technology and Engineering Center (INTEC), formerly known as Idaho Chemical Processing Plant (ICPP), provided by a vendor under a design/build/turnkey procurement contract.

The Long Term Storage of Three Mile Island-2 Fuel Project includes construction of a canister dewatering and drying system, and a Nuclear Regulatory Commission (NRC) licensed Independent Spent Fuel Storage Installation (ISFSI).

The purpose of this project is to provide dry fuel storage capabilities for the fuel bearing material currently stored in the TAN-607 Pool and thus reduce the current risk of submerged fuel storage. The TAN-607 Pool does not meet current DOE Orders. A commercially available and licensable dry storage system will be constructed at Idaho Nuclear Technology and Engineering Center to receive and store the Three Mile Island-2 fuel canisters. A dewatering and drying system will be installed at TAN to remove the water from the canisters prior to transport and dry storage. (Drying operation is not in project scope.)

Justification of need for the Long Term Storage of Three Mile Island-2 Fuel Project is five fold. In prioritized order, this project will:

1) Comply with DOE, the Department of Navy and the State of Idaho Agreement and the Federal District Court Order that incorporated as requirements, the terms and conditions of the parties Settlement Agreement. Paragraph E7 of this agreement states: "DOE shall complete construction of the Three Mile

[a] Directed reduction of $466,000 due to rescission directed by Congress

Island dry storage facility by December 31, 1998. DOE shall commence moving fuel into the facility by March 31, 1999, and shall complete moving fuel into the facility be June 1, 2001".

2) Significantly reduce annual storage costs thus saving a substantial fraction of the planned operating funding ($2000 K+ per year for 30 years) for storage surveillance activities.

3) Avoid potential long-term problems associated with storage in an unlined, obsolete (circa 1950) pool. In addition to being unlined, installed pool monitoring apparatus does not exist.

4) Prolong canister life, thus eliminating subsequent repackaging costs, by removing the canisters from the lifetime-limiting water environment.

5) Allow removal of fuel materials from the pool thus allowing the facility to be made available for shut down, or decontamination, or decommissioning.

Failure to complete this project will result in non-compliance with the Idaho Settlement Agreement, continued acceptance of the financial, environmental and safety liabilities associated with storage in an aging, outdated pool, and postponement of the inevitable need to remove the pool contents to a more stable storage environment, with potential costs associated with repackaging.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design Costs	1,756	1,500
Project Management costs (2.3% of TEC)	652	0
Total, Engineering, design, inspection and administration of construction costs (8.6% of TEC)	2,408	1,500
Construction Costs		
Improvements to Land	505	275
Special Facilities	0	700
Specialized Equipment/Other Structures	15,591	15,132
Utilities	0	330
Removal cost less salvage	150	0
Inspection, design and project liaison, testing, checkout and acceptance	687	0
Construction Management Costs (<1% of TEC)	162	200
Project Management Costs	4,639	3,600
Total, Construction Costs	21,734	20,237
Contingency (approximately 13.8% of TEC)	3,858	3,763
Total, Line Item costs (TEC)	28,000	25,500

5. Method of Performance

The Department of Energy Idaho Operations Office (DOE-ID) assigned performance of the Line Item Scope of Work to Lockheed Martin Idaho Technologies Company (LMITCO). Lockheed Martin Idaho Technologies Company will be responsible for implementation of the project including selection of principal subcontractors. DOE Idaho Operations Office project management will be performed by the Spent Fuel Program Office. DOE Idaho Operations Office is the Nuclear Regulatory Commission licensee and is, therefore, responsible to the Nuclear Regulatory Commission for the system as documented in the Safety Analysis Report. Safety, environmental, and other project documentation will be furnished to the project on an as-needed basis by the DOE Idaho Operations Office and HQ matrix organizations.

Lockheed Martin Idaho Technologies Company (LMITCO), as the operating contractor, will provide project management services to coordinate all project activities. Lockheed Martin Idaho Technologies Company will be responsible for the development of the project's technical requirements, completion of the Architectural and Engineering design, review and management of the engineering and construction activities, coordination of long-lead procurement of construction materials and equipment, construction subcontracting, coordination of the activities of construction subcontractors, checkout of systems, and turnover of the completed project.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	FY 2001	Total
Project Cost						
Facility Cost						
Design	2,086	152	170	0	0	2,408
Construction	4,331	3,909	10,264	1,909	5,179	25,592
Total Facility Cost	6,417	4,061	10,434	1,909	5,179	28,000
Other Project Cost						
Conceptual design costs	0	0	0	0	0	0
NEPA documentation costs	228	0	0	0	0	228
Other project-related costs	2,653	715	902	320	682	5,272
Total other project costs	2,881	715	902	320	682	5,500
Total project costs	9,298	4,776	11,336	2,229	5,861	33,500
LESS: Non-Federal contribution	0	0	0	0	0	0
Total, Other project costs	9,298	4,776	11,336	2,229	5,861	33,500

7. Related Annual Funding Requirements

	(FY 2001 dollars in thousands)	
	Current Estimate	Previous Estimate
Annual facility operating costs	950	950
Annual facility maintenance and repair costs	0	0
Total related annual funding (operating from FY 2001 through FY 2021)	950	950

Post 2006 Completion

Program Mission

The Post 2006 Completion account includes Environmental Management projects currently planned to require funding beyond FY 2006 Within the Non-Defense Environmental Management appropriation, this account includes projects at the Oak Ridge Reservation in Tennessee, the Los Alamos National Laboratory in New Mexico, and a variety of multi-site activities.

After completion of cleanup, it will be necessary for the Environmental Management program to maintain a presence at some sites to monitor, maintain, and provide information on the contained residual contamination. These activities will be necessary to ensure the reduction in risk to human health is maintained. Such stewardship will include passive or active controls, and, often, treatment of ground water over a long period of time. The extent of long-term stewardship required at a site will reflect the end-state developed in consultation among the Department of Energy and other representatives of the Administration, Congress, Tribal Nations, representatives of regulatory agencies and state and local authorities, representatives of nongovernmental organizations, and interested members of the general public.

Program Goal

Accelerating cleanup and project completion is a central goal of the Environmental Management program. This goal is part of the strategies identified in the *Accelerating Cleanup: Paths To Closure* document, whereby all Environmental Management sites are working aggressively to reduce outyear costs by completing projects as soon and as efficiently as possible, thereby reducing life-cycle costs and schedules. For those sites in the Post 2006 Completion account, treatment will continue for the remaining "legacy" waste streams.

Program Objectives

- Continue to address the most serious environmental risks across the Department of Energy complex and ensure that facilities and activities pose no undue risks to the public and worker safety and health.
- Continue to be substantially in compliance with applicable environmental and other requirements and meet compliance milestones.
- Continue surveillance and maintenance of facilities.

Performance Measures

Environmental Management has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected for the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that Environmental Management has developed as a key component of the effort to accelerate cleanup and reduce costs. All Environmental Management activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, Environmental Management sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Albuquerque Operations Office	975	1,611	6,000	4,389	272.4%
Oak Ridge Operations Office	65,547	71,105	3,802	-67,303	-94.7%
Savannah River Operations Office	4,248	0	0	0	0.0%
Multi-Site	10,738	9,274	9,120	-154	-1.7%
FY 1999 Activities Financed by Prior Year Balances	0	5,534	0	n/a	n/a
Subtotal, Post 2006 Completion, Non-Defense	81,508	87,524	18,922	-68,602	-78.4%
Use of Prior Year Balances	0	-5,534	0	5,534	n/a
Total, Post 2006 Completion, Non-Defense	81,508	81,990	18,922	-63,068	-76.9%

Public Law Authorization:

Public Law 105-245, The Energy and Water Development Appropriations Act, Fiscal Year 1999.

Albuquerque

Mission Supporting Goals and Objectives

Program Mission

The mission of the Non-Defense Environmental Management, Post 2006 Completion program, carried out by the Albuquerque Operations Office, is to support a portion of the activities at the Los Alamos National Laboratory in New Mexico.

Program Goal

The Los Alamos National Laboratory has been designated as the lead laboratory for planning and operations for the recovery and dismantlement of unwanted radioactive sealed sources, from both the public and private sector, which have no previous or current disposition options. In this capacity, the Los Alamos National Laboratory provides solutions to complex-wide technical and operational issues associated with stabilization and storage of plutonium and other nuclear materials.

Program Objectives

The objective of the Radioactive Source Recovery Program is to establish compliance with the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Public Law 99-240) with respect to unwanted radioactive sealed sources, which under the Act, are made a Department of Energy responsibility. A further objective of this program is to remove these unwanted radioactive sources from the private and public sector as expeditiously as possible. This effort will reduce potential risk to the public health and safety and the environment by the systematic recovery of these sources for acceptance at the Los Alamos National Laboratory, where they can be deactivated and safely stored until a final disposition path is identified.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

This program was previously funded from the Department of Energy Headquarters as a developmental program. During this period the following accomplishments were made:

- Completed National Environmental Policy Act documentation to accept and dismantle unwanted radioactive sources at the Los Alamos National Laboratory
- Established a method to respond to emergencies involving radioactive sealed sources in cooperation with the Nuclear Regulatory Commission and State nuclear material licensing agencies Emergency recoveries have been made successfully.
- Implemented a procedure and conducted a pilot program to recover sources on a routine basis.
- Identified appropriate facilities at the Los Alamos National Laboratory to receive, store, and dismantle radioactive sources.
- Established cost-recovery feasibility per the requirements of Public Law 99-240.
- In FY 2000, this program shifts from a developmental effort to a fully operational program where infrastructure will be established and programmatic implementation will begin to achieve compliance with Public Law 99-240.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
AL/RSRP/LANL/Radioactive Source Recovery Program	975	1,611	6,000	4,389	272.4%
Total, Albuquerque	975	1,611	6,000	4,389	272.4%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Los Alamos National Laboratory	975	1,611	6,000	4,389	272.4%
Total, Albuquerque	975	1,611	6,000	4,389	272.4%

Site Description

Los Alamos National Laboratory

The Los Alamos National Laboratory encompasses over 43 square miles in northern New Mexico, and conducts major programs in multiple areas, including applied research in nuclear and conventional weapons in development, nuclear fission and fusion, nuclear safeguards and security, and environmental and energy research. The waste produced includes low-level, mixed, hazardous, transuranic, sanitary waste steams, and small amounts of other waste from research. The primary waste management activities include storage, treatment, and disposal of waste.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Los Alamos National Laboratory is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. The projects included in this section of the budget have not had an independent cost review of the scope. This is a new project, and it has undergone an internal cost review. The funds requested for FY 2000 are appropriate to perform the activities based upon an internal cost review of this project and a review of similar projects that have undergone independent reviews at this facility.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
AL/RSRP/LANL/ Radioactive Source Recovery Program			
The purpose of this program is to establish compliance with Public Law 99-240 with respect to the Department of Energy's responsibility for acceptance and disposition of unwanted radioactive sealed source devices and material covered by SECTION 3(b)(1) Paragraph (D) of the Act. Establishment of this program fulfills the Department of Energy's obligation to Congress described in the Recommendation of Management of Greater Than Class-C Low-Level Radioactive Waste Report to Congress in response to Public Law 99-240 (February 1987) (DOE/NE-0077) with respect to radioactive sealed sources. Establishment of this program in FY 2000 as an operational capability at the Los Alamos National Laboratory will begin the process of reducing risk to public health and safety and the environment posed by unwanted radioactive sealed sources for which no disposition path previously existed.			
■ Fiscal Year 2000 becomes the first year of full operations where infrastructure and operational capability will be implemented on an operational basis to address compliance with Public Law 99-240 with respect to radioactive sealed source devices.			
AL/RSRP/LANL/Radioactive Source Recovery Program	975	1,611	6,000
Metrics No quantifiable corporate performance measures are associated with this project.			
Total, Albuquerque	975	1,611	6,000

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
AL/RSRP/LANL/Radioactive Source Recovery Program	
■ Increase is due to transition from a Department of Energy Headquarters developmental effort, where planning and pilot-scale testing of methods and systems were demonstrated, to routine operational capabilities at the Los Alamos National Laboratory.	4,389
Total Funding Change, Albuquerque	4,389

Oak Ridge

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management, Post 2006 Completion account, carried out by the Oak Ridge Operations Office, is to direct and monitor implementation of the non-defense liquid waste treatment operations at the Oak Ridge National Laboratory, as well as the facility deactivation and environmental restoration activities within the Oak Ridge Reservation and several off-site properties in Tennessee contaminated by the Oak Ridge facility operations The non-defense activities are comprised of stabilization and deactivation of 50 excess facilities and their material at the Oak Ridge Reservation, and maintaining deactivated facilities in a safe, low cost, environmentally sound condition, awaiting final decommissioning at the 2,900 acre Oak Ridge National Laboratory. Deactivation of these facilities will reduce the risks posed by 1,400,000 curies of radioactive material and 60 tons of sodium and lithium hydride, and ultimately reduce the annual costs for surveillance and maintenance from $10,000,000 to $1,500,000 by FY 2003. Contamination at the Lower East Fork Poplar Creek and Clinch River/Poplar Creek are managed as off-site release sites

Program Goal

The overall goal at the Oak Ridge Reservation is to complete all remedial action sites by FY 2013, and to meet acceptance criteria for transfer by FY 2003 to the decommissioning program of fifty excess facilities currently under the deactivation program. These activities assume a cumulative enhanced performance efficiency of about 30 percent through FY 1999.

Program Objectives

The program objectives are to continue surveillance and maintenance of 50 excess facilities and complete vulnerability resolutions in response to the Defense Nuclear Facilities Safety Board

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table, as well as at a project level, in the Detailed Program Justification

Significant Accomplishments and Program Shifts

- In FY 2000, the majority of the remediation and decontamination and decommissioning activities have been consolidated under the Defense appropriation
- For those facilities, which make up the High Ranking and Isotopes Facilities Deactivation Programs, continued surveillance and maintenance activities for 41 facilities (FY 1998) and continue surveillance and maintenance for 27 facilities (FY 1999).
- At the Tower Shielding Facility, completed procurement of fuel baskets; completed removal/consolidation of surplus materials; removed radioactive sources at Buildings 7700B and 7704 not needed by lessee, leased the facility to a private company (FY 1998); and complete disposition of sodium and lithium hydride shields from the facility (FY 1999).
- At the Bulk Shielding Reactor, completed fuel removal and shipped to the Savannah River Site (FY 1998).
- Transitioned 14 facilities from nuclear material and facilities stabilization activities to environmental restoration activities (FY 1998) and complete deactivation of four facilities (Buildings 3026C, 3026D, 7720, and 13822) (FY 1999).
- Removed 1,190,500 curies of strontium and 27 curium sources from Building 3517 (FY 1998).
- Continued deactivation activities in Buildings 3026D and 3038 (completed cleanup of the barricades) (FY 1998) and continue deactivation activities in Building 3038 (FY 1999).
- For the Melton Valley Watershed, finalized the feasibility study and proposed plan (FY 1998) and issue Record of Decision (FY 1999).
- Completed sludge removal from the old hydro fracture tanks and gunite tank W-6 (FY 1998).
- Removed blockages from the Molten Salt Reactor experiment off gas system (FY 1998).
- Begin remedial action at the main plant surface impoundments in Bethel Valley (FY 1999).
- Provides grants to the State of Tennessee through Agreements-in-Principle and the Federal Facilities Act Agreement and funding for the National Metal Recycle Center of Excellence (FY 2000).
- Surveillance and maintenance required for excess facilities at the Oak Ridge National Laboratory in compliance with Code of Federal Regulations (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OR-38212 / Low-Level Waste	7,233	0	0	0	0.0%
OR-43201 / Oak Ridge National Laboratory Melton Valley Watershed	15,096	33,434	0	-33,434	-100.0%
OR-43202 / Oak Ridge National Laboratory Melton Valley Watershed Remedial Action	2,927	2,573	0	-2,573	-100.0%
OR-43203 / Oak Ridge National Laboratory Melton Valley Bethel Valley Remedial Action	19,194	18,473	0	-18,473	-100.0%
OR-43204 / Oak Ridge National Laboratory Bethel Valley Decontamination and Decommissioning	4,302	5,197	0	-5,197	-100.0%
OR-48203 / Off-site Remedial Actions	6,993	3,427	400	-3,027	-88.3%
OR-48204 / Directed Support	1,523	1,100	1,105	5	0.5%
OR-63201 / Nuclear Materials Facility Stabilization	8,279	6,901	2,297	-4,604	-66.7%
Total, Oak Ridge	65,547	71,105	3,802	-67,303	-94.7%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Reservation	15,512	6,901	2,297	-4,604	-66.7%
Oak Ridge National Laboratory	41,519	59,677	0	-59,677	-100.0%
Oak Ridge Off-site	6,993	3,427	400	-3,027	-88.3%
Oak Ridge Operations Office	1,523	1,100	1,105	5	0.5%
Total, Oak Ridge	65,547	71,105	3,802	-67,303	-94.7%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Actions/Release Sites			
Assessments	9.0	78.0	85.0
Cleanups	8.0	4.0	5.0
Facilities			
Buildings Deactivated	0.0	0.0	10.0
In Post-Deactivation Monitoring	0.0	14.0	24.0
Not Yet Deactivated/Monitored	22.0	22.0	12.0
Nuclear Materials			
Made Disposition Ready - Other Forms of Nuclear Material	1.0	0.0	0.0
Facility Decommissioning			
Assessments	1.0	12.0	41.0
Spent Nuclear Fuel			
Stabilized (m^3)	0.032	0.132	0.000
Stabilized (MTHM)	0.013	0.015	0.000
Stable, Not Disposition Ready (m^3)	0.360	0.360	0.391
Stable, Not Disposition Ready (MTHM)	0.011	0.011	0.014
In Disposition Ready Storage (m^3)	0.000	0.256	0.605
In Disposition Ready Storage (MTHM)	0.000	0.151	0.177
In Stabilization Process (m^3)	0.009	0.000	0.000
In Stabilization Process (MTHM)	0.158	0.000	0.000
Made Disposition Ready (m^3)	0.056	0.031	0.016
Made Disposition Ready (MTHM)	0.091	0.000	0.005

SITE DESCRIPTION

Oak Ridge Reservation

The Oak Ridge Reservation encompasses about 37,000 acres and is comprised of three facilities; the Y-12 Plant, which was a uranium processing facility and now dismantles nuclear weapons components and serves as the nation's storehouse for special nuclear materials; the East Tennessee Technology Park, which was a uranium enrichment facility and is now being transitioned through reindustrialization; and the Oak Ridge National Laboratory, which conducts applied and basic research in energy technologies and in the physical and life sciences. Only the Oak Ridge National Laboratory is funded under the Non-Defense Post 2006 Completion account.

Oak Ridge National Laboratory

Activities carried out at the Oak Ridge National Laboratory historically have supported both the defense production operations and civilian energy research effort. This group of facilities requires cleanup resulting from a variety of research and development activities, which were supported from past DOE programs and many facilities were supported by multiple programs over a long period of time.

The Oak Ridge National Laboratory currently conducts applied and basic research in energy technologies and the physical and life sciences. Transuranic, mixed low-level, hazardous and sanitary, and industrial waste are managed at the three Oak Ridge Reservation facilities. Although the operations are different the waste generated from these operations is essentially the same.

Due to past efforts conducted, funding for annual assessment/cleanup has been split between two appropriation accounts and in FY 2000 the majority of support will be funded under the Defense Environmental Restoration and Waste Management Appropriation.

Off-Site

There are several off-site release sites including the Lower East Fork Poplar Creek, the Clinch River/Poplar Creek, the Atomic City Auto Parts, the Oak Ridge Tool and Engineering Site, and the David Witherspoon Site that were contaminated due to reservation operations. All waste types are stored, treated, and disposed in compliance with regulations.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Oak Ridge Operations Office, Environmental Management, in the Non-Defense Post 2006 Completion account is managed through an incentivized integrated contract, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to strive towards the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. The projects included in this section of the budget have had an independent review of the scope, and of the process used to develop the request for FY 2000.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OR-38212 / Low-Level Waste Non-Defense - Includes Line-Item construction project 94-E-602			
Perform all necessary activities to compliantly treat liquid low-level waste generated from the Oak Ridge National Laboratory.			
■ Comparable FY 1999 and FY 2000 funding and metrics are under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation (PBS OR-38112/FY 1998 $32,643,000; FY 1999 $26,741,000; and FY 2000 $31,821,000); included in the funding totals in FY 1998 are $1,900,000 for line-item 94-E-602.			
OR-38212	7,233	0	0
Metrics			
Metrics for FY 1998-FY 2000 are reflected in PBS OR-38112 (Defense Environmental Restoration and Waste Management).			
OR-43201 / ORNL Melton Valley Watershed Decontamination and Decommissioning			
This project is to decontaminate and decommission the inactive facilities in the Melton Valley Area of the Oak Ridge National Laboratory.			
■ Comparable funding is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation (PBS OR-43101/FY 1998 $6,623,000; FY 1999 $0; and FY 2000 $24,307,000).			
OR-43201	15,096	33,434	0
Metrics			
Remedial Action/Release Sites			
Assessments	5.0	53.0	0.0
Cleanups	0.0	1.0	0.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

OR-43202 / ORNL Melton Valley Watershed Remedial Action

This project is for the environmental restoration of all contaminated areas located in the lower half of the White Oak Creek Watershed.

- Comparable funding is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation (PBS OR-43102/FY 1998 $464,000; FY 1999 $0; and FY 2000 $1,300,000).

OR-43202	2,927	2,573	0
Metrics			
Remedial Action/Release Sites			
Assessments	0.0	24.0	0.0
Cleanups	5.0	0.0	0.0
Facility Decommissioning			
Assessments	1.0	12.0	0.0

OR-43203 / ORNL Bethel Valley Remedial Action

This project is for the environmental restoration and long-term surveillance and maintenance of all contaminated areas located in the upper half of the White Oak Creek Watershed.

- Comparable funding is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation (PBS OR-43103/FY 1998 $833,000; FY 1999 $0; and FY 2000 $28,569,000). Metrics are reflected below.

OR-43203	19,194	18,473	0
Metrics			
Remedial Action/Release Sites			
Assessments	4.0	0.0	85.0
Cleanups	3.0	3.0	5.0
Facility Decontamination and Decommissioning			
Assessments	0.0	0.0	1.0

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-43204 / ORNL Bethel Valley Decontamination and Decommissioning			
This project is to carry out pre-decommissioning surveillance and maintenance to support ongoing Oak Ridge National Laboratory Bethel Valley Decontamination and Decommissioning activities			
■ Comparable funding is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation (PBS OR-43104/FY 2000 $3,629,000). Metrics are reflected below.			
OR-43204	4,302	5,197	0
Metrics			
Remedial Site			
Assessments	0.0	1.0	0.0
Facility Decommissioning			
Assessment	0.0	0.0	40.0
Cleanups	0.0	0.0	0.0
OR-48203 / Off-site Remedial Actions			
This project is to address environmental restoration of locations down gradient from and/or outside the Department of Energy property			
■ Additional funding to support this activity is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation and Uranium Enrichment Decontamination and Decommissioning Fund (total FY 2000 funding $23,839,000).			
■ Conduct subcontract closeout activities.			
OR-48203	6,993	3,427	400
Metrics			
This project has associated corporate performance measures; however, no measures are reportable in the three year budget profile.			
OR-48204 / Directed Support			
This project is to carry out activities of directed support in FY 2000.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Directed support provides grants to the State of Tennessee through Agreements-in-Principle and the Federal Facilities Act Agreement. This account also supports other directed support programs and is split-funded with the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation and the Uranium Enrichment Decontamination and Decommissioning Fund (total FY 2000 funding $10,367,000).			
■ Provide grants to the State of Tennessee			
■ Conduct subcontract close-out activities.			
■ Conduct work-force transition activity not related to section 3161 of the Defense Authorization Act.			
■ Provide funding for the National Metal Recycle Center of Excellence.			
■ Conduct other directed activities			
OR-48204	1,523	1,100	1,105

Metrics
No quantifiable corporate performance measures are associated with this project.

OR-63201 / Nuclear Materials Facility Stabilization

This project is responsible for the deactivation of 50 excess facilities at the Oak Ridge National Laboratory to a safe, low cost, and environmentally sound condition. The program also conducts surveillance and maintenance activities required to maintain the facilities in a safe, secure, and environmentally sound condition until deactivation is completed

In FY 2000, the requested level of funding will provide the necessary, minimum level of surveillance and maintenance required to maintain excess facilities in a safe manner By funding these activities in FY 2000, it will allow the program to be in compliance with the CFR 41-101 47.4000, which prohibits the abandonment of excess facilities. The funding level being requested is appropriate for these activities based on historical data This project is split funded with the Defense Environmental Restoration and Waste Management Appropriation (total FY 2000 funding $9,937,000). The total metrics for this project are reflected below.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Will continue surveillance and maintenance activities for 15 facilities.			
OR-63201	8,279	6,901	2,297
Metrics			
Facilities			
In Post-Deactivation Monitoring	0.0	14.0	24.0
Not Yet Deactivated/Monitored	22.0	22.0	12.0
Building Deactivations - Deactivated During Period	0.0	0.0	10.0
Nuclear Materials			
Made Disposition Ready - Other Forms of Nuclear Material	1.0	0.0	0.0
Spent Nuclear Fuel			
Stabilized (m^3)	0.032	0.132	0.000
Stabilized (MTHM)	0.013	0.015	0.000
Stable, Not Disposition Ready (m^3)	0.360	0.360	0.391
Stable, Not Disposition Ready (MTHM)	0.011	0.011	0.014
In Disposition Ready Storage (m^3)	0.000	0.256	0.605
In Disposition Ready Storage (MTHM)	0.000	0.151	0.177
In Stabilization Process (m^3)	0.009	0.000	0.000
In Stabilization Process (MTHM)	0.158	0.000	0.000
Made Disposition Ready (m^3)	0.056	0.031	0.016
Made Disposition Ready (MTHM)	0.091	0.000	0.005
Total, Oak Ridge	65,547	71,105	3,802

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OR-43201 / Oak Ridge National Laboratory Melton Valley Watershed D&D	
■ Comparable funding is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation The Oak Ridge National Laboratory is a complex, multi-program funded site, historically supporting both weapons production and energy research activities.	-33,434
OR-43202 / Oak Ridge National Laboratory Melton Valley Remedial Action	
■ Comparable funding consolidated under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation. The Oak Ridge National Laboratory is a complex, multi-program funded site, historically supporting both weapons production and energy research activities.	-2,573
OR-43203 / Oak Ridge National Laboratory Bethel Valley Watershed Remedial Action	
■ Comparable funding consolidated under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation The Oak Ridge National Laboratory is a complex, multi-program funded site, historically supporting both weapons production and energy research activities	-18,473
OR-43204 / Oak Ridge National Laboratory Bethel Valley D&D	
■ Comparable funding consolidated under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation. The Oak Ridge National Laboratory is a complex, multi-program funded site, historically supporting both weapons production and energy research activities.	-5,197
OR-48203 / Off-site Remedial Action	
■ Majority of the funding for off-site remediations is under the Environmental Management/Defense Environmental Restoration and Waste Management Appropriation and the Uranium Enrichment Decontamination and Decommissioning Fund.	-3,027
OR-48204 / Directed Support	
■ No significant change.	5
OR-63201 / Nuclear Materials Facility Stabilization	
■ This decrease is the result of all deactivation work scheduled for the High Ranking Facilities Deactivation Project and the Isotope Facilities Deactivation Project being deferred in order to direct limited funding resources to higher priority activities, including compliance requirements.	-4,604
Total Funding Change, Oak Ridge	-67,303

Savannah River

Mission Supporting Goals and Objectives

Mission

This program activity supports remediation at the Savannah River Site, which is located in south-central South Carolina and is bordered on the southwestern side by the Savannah River. The closest major population centers are Aiken, South Carolina and Augusta, Georgia. Operations at the Heavy Water Component Test Reactor was terminated in 1964 deactivated in 1963. Ancillary buildings and equipment were removed in 1994. National Environmental Policy Act documentation, asbestos removal and decontamination and decommissioning began in 1995. The partially decommissioned reactor is currently scheduled for decontamination and decommissioning surveillance and maintenance activities, which will continue until completion of the decontamination and decommissioning phase.

Program Goal

The Savannah River Site is committed to closure of the Heavy Water Component Test Reactor dome to prevent deliberate entry and removal of any exterior components not expected to last at least sixty years.

Program Objectives

The Savannah River Site intends to prepare the Heavy Water Component Test Reactor for long-term storage. Chemical, radiological, and toxic hazards will be controlled through confinement to protect site workers, the public and the environment.

This project provides for the deactivation of the Heavy Water Component Test Reactor only. Additional projects will be required to meet the Environmental Management site end state. Contamination in the Heavy Water Component Test Reactor has not been defined. No plans have been made to reuse the Heavy Water Component Test Reactor after deactivation (post-FY 1998).

No nuclear materials, spent fuel, or high-level waste are stored in the Heavy Water Component Test Reactor, nor will any be generated. Waste streams generated will be defined in the deactivation plan when complete. Specific treatment methodologies for these wastes will depend on characterization, which has not been performed at this time.

According to the Heavy Water Component Test Reactor draft deactivation plan, the reactor dome doors will be welded shut. No provision for routine surveillance and maintenance will be made. The Heavy Water Component Test Reactor will remain in this state until such time as a final disposition action is funded.

Performance Measures

Performance Measures are provided at an aggregate level after the Funding by Site table; as well as at a project level, in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

- The Heavy Water Component Test Reactor will be deactivated and placed into long-term surveillance and maintenance mode (FY 1998). No entries into the facility are planned after FY 1998.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
SR-ER09 / Heavy Water Component Test Reactor Projects	4,248	0	0	0	0%
Total, Savannah River	4,248	0	0	0	0%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Savannah River Westinghouse Company	4,248	0	0	0	0%
Total, Savannah River	4,248	0	0	0	0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
SR-ER09 / Heavy Water Component Test Reactor			
This project is intended to prepare the Heavy Water Component Test Reactor for long-term storage.			
■ The reactor has been placed into long-term surveillance and maintenance mode. No funding required.			
SR-ER09	4,248	0	0
Metrics			
No quantifiable corporate performance measures are associated with this project.			
Total, Savannah River	4,248	0	0

Multi-Site

Mission Supporting Goals and Objectives

Mission

The mission of the Non-Defense Environmental Management Post 2006 Completion account carried out by the Multi-Site programs includes funding for a small number of essential crosscutting Environmental Management (EM) activities. This activity consists of technical support activities, Packaging Certification and Transportation Safety activities and the Pollution Prevention program The Environmental Management program is being responsive to the General Accounting Office and others who have pushed for a greater emphasis on a more National focus for the EM programs.

Program Goal

The goals of the Multi-Site programs will allow EM to better coordinate EM-wide and Department of Energy (DOE)-wide program efforts and avoid overlaps and inconsistencies.

The mission of the Packaging Certification program is to support the protection of people and property from the potential consequences of normal and accident conditions of transport involving hazardous materials. The goals to support this mission are.

- Improve safety of packages used to transport hazardous materials through a program of design review, performance tests, and quality verification that satisfy internal operations and organizations external to the Department.
- Improve existing and develop new processes to maximize the efficiencies of these reviews and tests. Maintain an open and effective system of communication and coordination both internal and external to the Department.
- Ensure the package safety policies protect workers, the public, and the environment while providing program flexibility in accomplishing Departmental missions
- Ensure that the Package Certification and Safety Program is the Department's technical knowledge and analysis center for hazards classifications, design reviews, package training support and safety requirements.
- Ensure that package safety policies are coordinated with all affected customers and provide sufficient clarity of guidance to be correctly implemented.

The mission of the Office of Pollution Prevention is to reduce the generation of all waste streams in order to minimize the impact of the Department's operations on the environment, reduce operational costs, and improve the safety and health of its operations

These funds will allow the Department to meet the Secretary of Energy's pollution prevention goals to be achieved by December 31, 1999, as stated below:

- Reduce by 50 percent the generation of radioactive waste
- Reduce by 50 percent the generation of hazardous waste
- Reduce by 50 percent the generation of low-level mixed waste
- Reduce by 33 percent the generation of sanitary waste
- Recycle 33 percent of sanitary waste from all operations
- Increase procurement of Environmental Protection Agency designated recycled products to 100 percent, except where they are not commercially available at a reasonable price or do not meet performance standards.

The Department has established an additional goal to reduce waste generation from cleanup and stabilization activities by 10 percent annually, beginning in FY 1999 and will strive to achieve greater waste reduction in future years through continuous improvement.

Program Objectives

The Multi-Site activities focus' national attention on several areas that impact Environmental Management-wide goals and planned efforts, which cut across the Department of Energy complex.

Performance Measures

There are no Performance Measures associated with the Multi-Site activities.

Significant Accomplishments and Program Shifts

Technical Support to ER

- Provide technical support for EM/environmental restoration initiatives, including performance measure tracking/verification activities; project/baseline review/analysis efforts; and strategic/management plans (FY 1998/FY 1999/FY 2000).

Packaging Certification

- Continue efforts to reduce the backlog of safety reviews for packagings (FY 1998/FY 1999/FY 2000).
- Represent the Department of Energy in the United States delegation supporting international transportation safety and packaging certification regulations (FY 1998/FY 1999).

Pollution Prevention

- Maintain pollution prevention infrastructure at the Energy Technology Engineering Center, Lawrence Berkeley National Laboratory, and the Stanford Linear Accelerator Center to comply with the Resource Conservation and Recovery Act and the California pollution prevention requirements (FY 1998/FY 1999/FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQ-2-00 / Technical Support to ER	5,193	5,418	5,304	-114	-2.1%
HQ-PC-001 / Packaging Certification	4,648	3,756	3,716	-40	-1.1%
OPS/HQ-PP / Pollution Prevention	897	100	100	0	0.0%
Total, Multi-Site	10,738	9,274	9,120	-154	-1.7%

Site Description

The Multi-Site program budget supports the direction, coordination, tracking, and implementation of the EM programs among the multitude of sites where environmental management activities are being carried out. Activities supported include technical integration activities, document reviews, and cooperative agreements.

The Packaging Certification and Transportation Safety program activities provide for developing, coordinating, and implementing policies, standards, and guidance for aviation, maritime, rail, highway, pipeline, and hazardous materials safety for the Department. Under the authority provided by the United States Department of Transportation in 49 CFR, this program certifies Fissile and Type B packages for the transportation of radioactive materials for the Department. Evaluation and analysis of the Department of Energy line organizations' safety analysis reports for packaging are performed, in addition to providing external coordination between the Government and other governmental, commercial, and international bodies regarding packaging certification and transportation safety systems

The Office of Pollution Prevention coordinates pollution prevention program activities for the entire Department and provides non-defense resources to the DOE Oakland Operations Office. Its mission is to reduce the generation of all waste streams in order to minimize the impact of the Department's operations on the environment, reduce operational costs, and improve the safety and health of its operations.

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure* report. The funds requested for FY 2000 are appropriate to perform the activities based on a historical level of effort cost. No quantifiable corporate performance measures are associated with these projects.			
HQ-2-00 / Technical Support to ER			
The activities funded by this project include a variety of crosscutting efforts that support required Environmental Restoration and EM initiatives. Technical support is provided in the areas of performance measure tracking; information/data management integration; and project review/analysis.			
■ Provide support for the cooperative agreement with the Volpe National Transportation System Center on improving management systems (including database support); the National Academy of Sciences (peer reviews on specific projects); the Environmental Protection Agency; and the General Service Administration.			
■ Provide for Headquarters-supported field activities including crosscutting technical support, program integration efforts; and support for the Residual Radioactive Code Development.			
HQ-2-00	5,193	5,418	5,304

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
HQ-PC-001 / Packaging Certification			
The Packaging Certification and Transportation Safety program supports the protection of people and property from the potential consequences of normal and accident conditions of transport involving hazardous materials. This program addresses the need for robust packages that provide containment in the event of a transportation incident or accident and the concerns of internal and external stakeholders. Activities also include developing, coordinating, and implementing policies, standards, and guidance related to aviation, maritime, rail, highway, pipeline, and hazardous materials safety. This program performs evaluations and analyses of safety analysis reports for packaging; providing external coordination between the Department and other governmental, commercial, and international bodies regarding transportation safety and packaging certification. The program participates in the development of transportation safety.			
■ About 34 applications and safety analysis reports for highly hazardous materials packages will be certified and about two moderate hazardous materials package tests and approvals will be done.			
■ Technical support or assistance in packaging safety to one field office may be provided.			
■ The Standardized Computer Analyses for Licensing Evaluation and Small Casks Analysis System computer codes for confirmatory analysis during application and safety analysis report reviews, and the Radioactive Material Package database and website will be maintained			
HQ-PC-001	4,648	3,756	3,716
HQ/OPS-PP / Pollution Prevention			
This activity coordinates pollution prevention activities for the entire Department and provides non-defense resources to the Department of Energy Oakland Operations Office. Its mission is to reduce the generation of all waste streams in order to minimize the impact of the Department's operations on the environment, reduce operational costs, and improve the safety and health of its operations.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Maintain effective and compliant pollution prevention programs at the Oakland Operations Office to comply with Federal and California laws and regulations related to pollution prevention and waste minimization.			
OPS/HQ-PP	897	100	100
Total Multi-Site	10,738	9,274	9,120

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
HQ-2-00 / Technical Support to ER	
■ Environmental restoration crosscutting efforts in the areas of performance measure tracking, information/data management integration and project review and analysis are decreased.	-114
HQ-PC-001 / Packaging Certification	
■ Decrease reflects reduction in the number of applications for highly hazardous materials package certifications and for moderate hazardous materials package tests.	-40
Total Funding Change, Multi-Site	-154

Uranium Enrichment D&D

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Uranium Enrichment Decontamination and Decommissioning Fund

Proposed Appropriation Language

For necessary expenses in carrying out uranium enrichment facility decontamination and decommissioning, remedial actions and other activities of title II of the Atomic Energy Act of 1954 and title X, subtitle A of the Energy Policy Act of 1992, [$220,200,000] *$240,198,000*, to be derived from the Fund, to remain available until expended: *Provided*, That $30,000,000 of amounts derived from the Fund for such expenses shall be available in accordance with title X, subtitle A, of the Energy Policy Act of 1992. *(Energy and Water Development Appropriations Act, 1999.)*

Explanation of Change

None

Uranium Enrichment Decontamination and Decommissioning Fund

Program Mission

The Uranium Enrichment Decontamination and Decommissioning Fund was established by the Energy Policy Act of 1992 to carry out environmental management responsibilities at the nation's three gaseous diffusion plants. The three gaseous diffusion plants are located in the East Tennessee Technology Park in Tennessee, at the Portsmouth site in Ohio, and at the Paducah site in Kentucky. The Energy Policy Act also directs that this Fund be used to reimburse licensees operating uranium or thorium processing sites for the costs of environmental cleanup at those sites, subject to a site specific reimbursement limit.

The Uranium Enrichment Decontamination and Decommissioning Fund is an integral and necessary component of legislation to privatize uranium enrichment activities in the United States. The Uranium Enrichment Decontamination and Decommissioning Fund addresses the cleanup liabilities at the three gaseous diffusion plants that are attributable to historical DOE operations for weapons and commercial fuel. The future operations of the enrichment facilities will be managed by the commercial United States Enrichment Corporation. Ultimate cleanup of the facilities that are leased from the Department by the United States Enrichment Corporation will commence when operations are completed and the leases are terminated. The Decontamination and Decommissioning Fund includes contributions from annual budget appropriations and contributions from commercial utilities based upon historical enrichment services, measured in "separative work units."

Program Goal

The goal of the Uranium Enrichment Decontamination and Decommissioning Fund is to cleanup the surplus enrichment plants as soon as possible and reimburse licensees for their remediation activities at uranium and thorium sites. The enrichment plants include valuable facilities and equipment, and the cleanup costs will be offset to the extent that the Department is able to recover the value from these surplus assets.

Program Objectives

The Department plans to "re-industrialize" the surplus sites and infrastructure which will reduce the Department's cleanup cost and will transfer the surplus federal facilities to private sector firms for productive re-use. In this way, the local socio-economic impacts of shutting down these facilities will be offset by increased commercial job creation.

Performance Measures

EM has moved aggressively towards developing and implementing a performance-based budget that clearly demonstrates the program and project results expected with the resources requested. Building upon past experience, the FY 2000 budget was enhanced by aligning performance measures by project within the specific appropriation and program accounts. These performance measures can be found in the site details that follow.

Significant Accomplishments and Program Shifts

The FY 2000 budget request fully reflects the project-oriented structure that EM has developed as a key component to accelerate cleanup and reduce costs. All EM activities have been organized into projects which have a defined scope, schedule, cost, and end state. Through the strategies identified in the *Accelerating Cleanup: Paths to Closure* document, EM sites are working to sequence projects and track progress, thereby reducing life-cycle costs and schedules. Specific accomplishments and program shifts may be found in the site details that follow.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Uranium Enrichment D&D Fund	190,200	190,200	0	190,200	210,198
Uranium/Thorium Reimbursement	40,000	30,000	0	30,000	30,000
Total, UE D&D Fund	230,200	220,200	0	220,200	240,198

Title X, Subtitle A, Energy Policy Act of 1992

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Operations Office	190,200	190,200	210,198	19,998	10.5%
Multisite	40,000	30,000	30,000	0	>999.9%
Total, UE D&D Fund	230,200	220,200	240,198	19,998	9.1%

Oak Ridge

Mission Supporting Goals and Objectives

Program Mission

The Uranium Enrichment Decontamination and Decommissioning Fund was established by the Energy Policy Act of 1992 and is carried out by the Oak Ridge Operations Office to cleanup the nation's three gaseous diffusion plants. The three gaseous diffusion plants are located in Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. The gaseous diffusion plant in Oak Ridge was shut down in 1985. The plants in Portsmouth and Paducah have been operated by the United States Enrichment Corporation since 1993. The Uranium Enrichment Decontamination and Decommissioning Fund supports decontamination and decommissioning, remedial actions, waste management, and surveillance and maintenance of the three gaseous diffusion plants. The Uranium Enrichment Decontamination and Decommissioning Fund is currently the sole funding source for cleanup at Portsmouth and Paducah, and is the dominant source of funds for the Oak Ridge Gaseous Diffusion Plant. The Uranium Enrichment Decontamination and Decommissioning Fund also reimburses licensees for cleanup of uranium and thorium processing sites that previously sold these materials to the government.

Program Goal

The Oak Ridge Operations Office goals are to continue ongoing remedial actions to prevent the spread of existing contamination, and waste management activities to address legacy wastes at the sites; complete ongoing remedial actions by FY 2002 and waste management activities by FY 2005 at Portsmouth and complete ongoing remedial action and waste management activities at Paducah by FY 2010. Comprehensive decontamination and decommissioning and cleanup of these sites cannot be completed until the privatized United States Enrichment Corporation terminates the leases on the two plants. The Department's cleanup goal for the gaseous diffusion plants will allow reuse of the sites for industrial purposes. To fulfill this goal, the Department must remove hazardous materials, treat and dispose of legacy waste, remediate sites to meet industrial reuse standards, decontaminate facilities to allow reuse, and demolish unusable facilities. Where possible, new technologies will be employed to address waste treatment, groundwater cleanup, and facility decontamination. The East Tennessee Technology Park is implementing all of these aspects in the ongoing cleanup program. The Department is actively transitioning the site from a federally-managed DOE installation to a privately-managed industrial park. The name of the site was changed from the Oak Ridge Gaseous Diffusion Plant to the East Tennessee Technology Park to reflect this ongoing transition. The leasing program will be fully implemented by 2006 and the site cleanup will be complete in 2009. The timely cleanup of the Oak Ridge site will free up funds to address cleanup at other sites following the cessation of operations. The cleanup program is being carried out under the requirements of federal and state compliance agreements that reflect community stakeholder involvement.

Program Objectives

The primary objective at Oak Ridge sites is to conduct remedial actions to limit the spread of contamination, waste management to remove legacy waste, and decommissioning to disposition the process and ancillary buildings. New technologies will be deployed, where possible, to address trichloroethylene contaminated soil and groundwater, for treatment of mixed waste, and for facility decontamination. Another objective is to solve cleanup challenges related to the significant amount of legacy wastes, the size and physical condition of the processing facilities and the areal extent of soil and groundwater contamination. For example, the Paducah groundwater plumes contain one of the largest volumes of off-site contamination in the Department of Energy complex.

The Oak Ridge Gaseous Diffusion Plant is shutdown, and the focus is on cleanup followed by re-use of viable facilities by private sector firms. Decommissioning of the three process buildings at the site will be completed to allow reuse by FY 2003.

Funding is requested to continue remedial actions that have prevented off-site migration of contaminants through groundwater at Portsmouth and reduce further migration of off-site groundwater plumes at Paducah. The Department plans to complete ongoing remediation at Portsmouth by FY 2002 and Paducah by FY 2010.

Performance Measures

Performance measures are provided at an aggregate level after the Funding by Site table as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

East Tennessee Technology Park

- Mobilized and began removal of nuclear and non-nuclear equipment (FY 1998); construct and begin operations of the decommissioning workshop and continue equipment removal (FY 1999); and initiate decontamination processing and authorized releases of clean metals (FY 1999) from the K-33 Process Building under the three building decommissioning contract to reduce outyear mortgage costs for surveillance and maintenance cost and provide beneficial reuse of buildings.
- Completed Defense Nuclear Facilities Safety Board 94-1 compliance driven Deposit Removal Project (FY 1998).
- Initiated and completed Group 1 Auxiliary Facilities Demolition Project, and initiated Building K-1420 decommissioning to reduce out year mortgage cost for surveillance and maintenance (FY 1998).
- Complete cleanup of classified burial ground and Mitchell Branch plumes to mitigate contaminant migration to groundwater (FY 1999).

Portsmouth Gaseous Diffusion Plant

- Completed multi layer cap (FY 1998) and design seep collection system to passive treatment (FY 1999) for the Peter Kiewit Landfill; completed X-735 Landfill cap and closure (FY 1998) and independent certification (FY 1999); and removed X-7725 Diesel underground storage tank and contaminated soil to prevent contaminant migration off-site and to the groundwater (FY 1998).
- Treated 51 m^3 of mixed low-level waste, 12 m^3 of low-level waste, and shipped 55 m^3 of mixed low-level waste for off-site disposal (FY 1998). Treat 41 m^3 of mixed low-level waste, 79 m^3 of low-level waste, and ship for off-site disposal 956 m^3 of mixed low-level waste and 2,146 m^3 of low-level waste (FY 1999).
- Initiated (FY 1998) and complete (FY 1999) Risk Reduction Actions for East Drainage Ditch, Big Run Creek, North Drainage Ditch, and Northeast Drainage Ditch and complete risk reduction actions for the X-701B Holding Pond area soils (FY 1999) to prevent contaminant migration off-site via surface water pathways.
- Complete design and initiate construction for shutdown of the X-622T Groundwater Treatment Facility to reduce out year cost of operation and maintenance (mortgage reduction) (FY 1999).
- Regulator approval of Corrective Measures Study Reports for the Quadrant I (X-749 Contaminated Materials Disposal Facility/X-120 Old Training Facility), Quadrant IV, and Quadrant II (X-701B Holding Pond area groundwater plumes) as required to meet Regulatory compliance milestones and enable corrective actions to be conducted in FY 2001 (FY 1999).
- At Portsmouth, complete transition from investigation and interim corrective measures of contaminated soil source areas which will lead to final corrective measures implementation of groundwater contamination (primarily Trichloroethylene) in FY 2002 and reduce legacy waste inventory (FY 2000).

Paducah Gaseous Diffusion Plant

- Federal Facility Agreement was signed and executed by DOE, Environmental Protection Agency, and State of Kentucky for integration strategy and establishing compliance milestones for Comprehensive Environmental Response Compensation and Liability Act/Resource Conservation and Recovery Act response actions (FY 1998).
- Completed Record of Decision and remedial action for nine release sites and approval for closure on 2 underground storage tanks (FY 1998); Record of Decision, remedial design and remedial construction for LASAGNA electro-osmosis technology in-situ remediation of the Former Cylinder Drop Test Area (FY 1999) to prevent the migration of contaminants from the source area to groundwater.
- Completed removal action at six polychlorinated biphenyl release sites, a waste oil tank release site, and an Oil Land Farm release site (FY 1998).
- Completed remedial investigation at the C-400 Chemical Cleaning Facility release sites, the C-747-C Oil Land Farm, the Former Cylinder Drop Test area, and the C-746-A Septic System; initiated remedial investigation at eight release sites (FY 1998) and complete remedial investigation at four release sites (FY 1999) to meet Federal Facility Agreement compliance milestones.

- Completed transfer of 15 fluorine cells and equipment to the Department of Defense for beneficial reuse (FY 1998).
- Shipped 188 m^3 of Resource Conservation and Recovery Act waste, 29 m^3 of Toxic Substances Control Act/Resource Conservation and Recovery Act liquid waste, and 133 m^3 of low level waste for off-site treatment and/or disposal; and completed Resource Conservation and Recovery Act closure of the C-746-R Storage Pad to reduce legacy waste inventory and waste storage footprint and meet Federal Facility Compliance Act Site Treatment Plan enforceable milestones (FY 1998).
- Ship for offsite disposal 63 m^3 of Resource Conservation and Recovery Act ash receivers, 333 m^3 of low level waste ash receivers, and approximately 1,000 polychlorinated biphenyl capacitors; complete recycling of current inventory of lead acid batteries; and complete treatment and disposal of 6.4 m^3 of pyrophoric uranium waste to reduce legacy waste inventory and waste storage footprint and meet Federal Facility Compliance Act Site Treatment Plan enforceable milestones (FY 1999).
- Complete engineering evaluation/cost analysis for removal and disposal of 51,000 tons of scrap metal and complete Vortec Vitrification Technology Demonstration Project environmental assessment and construction (FY 1999).
- Complete field and planning activities leading to a FY 2001 Record of Decision at Paducah for implementing the final remedial action of sources contributing to the existing Northeast and Northwest contaminated groundwater plumes; complete remedial action of LASAGNA™ electro-osmosis technology at the former Cylinder Drop Test Area; and reduce legacy waste inventory. Kentucky regulators are requesting total removal of a uranium burial area where DOE had proposed a presumptive remedy of capping and monitoring (FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
OR-44301 / ETTP Remedial Action	27,181	114	13,491	13,377	11734.2%
OR-44302 / ETTP Process Equip D&D	18,474	47,500	62,500	15,000	31.6%
OR-44303 / ETTP D&D	33,908	27,786	29,622	1,836	6 6%
OR-44305 / ETTP Landlord - D&D Fund	5,226	29,627	16,455	-13,172	-44.5%
OR-45301 / Paducah Remedial Action	20,020	20,788	20,647	-141	-0.7%
OR-45302 / Paducah Waste Management	19,562	15,195	16,853	1,658	10.9%
OR-46301 / Portsmouth Remedial Action	18,978	12,370	20,023	7,653	61.9%
OR-46302 / Portsmouth Waste Management	24,075	22,749	17,477	-5,272	-23.2%
OR-48303 / Off-site RA - D&D Fund	19,670	9,921	8,030	-1,891	-19.1%
OR-48304 / Directed Support	3,106	4,150	5,100	950	22.9%
Total, Oak Ridge	190,200	190,200	210,198	19,998	10.5%

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Oak Ridge Reservation	84,789	105,027	122,068	17,041	16.2%
Oak Ridge Off-site	19,670	9,921	8,030	-1,891	-19.1%
Paducah	39,582	35,983	37,500	1,517	4.2%
Portsmouth	43,053	35,119	37,500	2,381	6.8%
Oak Ridge Operations Office	3,106	4,150	5,100	950	22.9%
Total, Oak Ridge	190,200	190,200	210,198	19,998	10.5%

Metrics Summary

	FY 1998	FY 1999	FY 2000
Remedial Actions/Release Sites			
Assessments	6.0	9.0	94.0
Cleanups	26.0	8.0	11.0
Facility Decommissioning			
Assessments	2.0	3.0	261.0
Cleanups	4.0	8.0	1.0
Transuranic Waste (m^3)			
Treatment	1.0	0.0	0.0
Storage	5.0	5.0	6.0
Mixed Low-Level Waste (m^3)			
Treatment	239.0	59.0	70.0
Storage	13,542.0	12,550.0	11,484.0
On-site Comm. Disposal	1,597.0	6,996.0	1,265.0
Shipped to DOE Disposal	133.0	1,032.0	116.0
Low-Level Waste (m^3)			
Treatment	41.0	86.0	68.0
Storage	115,758.0	113,642.0	113,067.0
On-site Comm. Disposal	2,066.0	779.0	1,192.0
Shipped to DOE Disposal	104.0	2,146.0	164.0
Hazardous Waste (MT)			
Commercial Waste	0.0	0.0	46.0

Site Description

Oak Ridge Operations Office

The Oak Ridge Operations Office manages, coordinates, tracks, and assists in the implementation of the Environmental Management program among the various sites. Oak Ridge leads the National Program for Metal Recycle, as well as crosscutting integration efforts related to the Oak Ridge sites. In addition, the Oak Ridge Operations Office manages oversight agreements with the States of Tennessee, Ohio, and Kentucky and provides funding for all off-site projects.

Oak Ridge Reservation

The Oak Ridge Reservation encompasses about 37,000 acres and is comprised of three facilities; the Y-12 Plant, which was a uranium processing facility and now dismantles nuclear weapons components and serves as the nation's storehouse for special nuclear materials; the East Tennessee Technology Park, which was a uranium enrichment facility and is now being transitioned through reindustrialization; and the Oak Ridge National Laboratory, which conducts applied and basic research in energy technologies and in the physical and life sciences. Only East Tennessee Technology Park is funded under the Uranium Enrichment D&D Fund.

East Tennessee Technology Park (formerly K-25)

The East Tennessee Technology Park is located on a 1,500 acre tract of land adjacent to the Clinch River, approximately 10 miles west of Oak Ridge, Tennessee. It was built as part of the World War II Manhattan Project and used to enrich uranium for national defense purposes. By the mid-1950s, five large uranium enrichment buildings covering 114 acres were in operation: K-25, K-27, K-29, K-31, and K-33. Four electrical switch yards and eight cooling towers served these buildings. Machinery was fabricated, serviced, repaired, and cleaned at on-site facilities. Enrichment of weapons-grade uranium ceased in 1964. The plant continued to produce low enriched uranium for commercial nuclear power purposes until 1985, when the plant was shut down.

Paducah

The Paducah Gaseous Diffusion Plant is located approximately 15 miles west of Paducah, Kentucky, near the Ohio River. Department property comprises nearly 3,500 acres; 750 acres are inside the site's security fence, and 2,000 acres are leased to the Kentucky Department of Fish and Wildlife. Plant process buildings cover 74 acres. Paducah began operations in 1952 to produce low-assay enriched uranium for use as commercial nuclear reactor fuel. In 1993, uranium enrichment operations were turned over to the United States Enrichment Corporation in accordance with the Energy Policy Act of 1992.

Portsmouth

The Portsmouth Gaseous Diffusion Plant is located approximately 22 miles north of Portsmouth, Ohio. Construction of the 3,714 acre site began in 1952. Plant process buildings cover 93 acres. The mission of the plant was to increase the national production of enriched uranium and maintain the nation's superiority in the development and use of nuclear energy. Since 1991, the plant has produced only low-enriched uranium for commercial power plants. In 1993, uranium enrichment operations were turned over to the United States Enrichment Corporation in accordance with the Energy Policy Act of 1992.

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

The Oak Ridge Operations Office Environmental Management projects under the Uranium Enrichment Decontamination and Decommissioning Fund are managed by a Management and Integration contractor through incentivized contracts, with fixed-price subcontracts, to assure the most cost efficient service to the Government. The scope planned for FY 2000 has been reviewed and is appropriate to meet the goals of the site as outlined in the *Accelerating Cleanup: Paths to Closure*. Project Baselines for activities included in this section of the budget have had, or planned to have an independent cost review of the scope, and the funds requested for FY 2000 are appropriate to perform the activities based on a historical level of effort and fixed-price contracts. Regulatory drivers for cleanup are Federal Facility Agreements which integrate Comprehensive Environmental Response Compensation and Liability Act and Resource Conservation and Recovery Act requirements; Consent Orders issued by the State regulators for permitted hazardous waste units; Resource Conservation and Recovery Act Part B hazardous waste management permits; Toxic Substances Control Act regulations for management of polychlorinated biphenyls; and Federal Facility Compliance Agreements for management of legacy mixed waste. The agreements establish enforceable milestones for completing major activities at the sites consistent with site Baselines.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-44301/ETTP Remedial Action			
Carry out activities at the East Tennessee Technology Park watershed including removal of hazardous materials, treatment, and disposal of remediation waste, source control/elimination to preclude the additional spread of contamination and remediation of soils, groundwater, and building structures to industrial use standards and initiate long-term surveillance and maintenance.			
■ Complete and submit the Record of Decision for the East Tennessee Technology Park watershed to the regulators for approval.			
■ Begin excavation of K-1070-A Contaminated Burial Ground.			
■ Initiate the K-1070-C/D G-Pit and Concrete Pad remediation.			
■ Complete shipments of unstabilized pond waste sludge to Envirocare of Utah for treatment and disposal (1,167,000 kilograms will be shipped in FY 2000).			
OR-44301	27,181	114	13,491
Metrics			
Facility Decontamination and Decommissioning			
Assessments	0.0	1.0	5.0
Cleanups	0.0	6.0	1.0
Remedial Action/Release Sites			
Assessments	5.0	0.0	66.0
Cleanups	17.0	0.0	3.0
Mixed Low-Level Waste (MLLW)			
Disposal - DOE Onsite/Commercial (m^3)	1,438.0	0.0	1,167.0
OR-44302 East Tennessee Technology Park Process Equipment Decontamination and Decommissioning			
This fixed price project involves the removal of process equipment and the decontamination of the contaminated equipment and building space from 3 of the 5 process buildings on the East Tennessee Technology Park site. The decontaminated buildings will be released for reindustrialization leasing upon completion. The decontaminated metals will be regulated, released, and recycled.			
■ Continue removal and decontamination of cascade equipment in the K-33 Process Building.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Initiate removal and decontamination of cascade equipment in the K-31 Process Building.			
OR-44302	18,474	47,500	62,500
Metrics			
Mixed Low-Level Waste (MLLW)			
Disposal - DOE Onsite/Commercial (m^3)	0.0	6,982.0	60.0

OR-44303/East Tennessee Technology Park Decontamination and Decommissioning

Decommissioning, demolition, and surveillance and maintenance of surplus buildings at the East Tennessee Technology Park (this activity does not include the 3 building decommissioning contract with BNFL, Inc.). Buildings that can be reused will be decontaminated and buildings that are not suitable for reuse, such as the original K-25 building, will be demolished. Surplus buildings and release sites in the East Tennessee Technology Park will be covered by the ongoing surveillance and maintenance program. (Split funded in the Defense Environmental Restoration and Waste Management appropriation, total FY 2000 funding $37,002,000.)

- Complete the Group 1 (5 buildings) Auxiliary Facilities Decommissioning/Demolition Project.
- Continue surveillance and maintenance for surplus buildings and release sites under federal control.
- Continue deactivation and decontamination of the decontamination building (1420 building).
- Continue deactivation of the original K-25 process building.
- Additional deactivation of ancillary buildings associated with K-25, K-27 and the main plant area.
- Various facility assessments will be completed.

OR-44303	33,908	27,786	29,622

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Metrics			
Facility Decommissioning			
Assessments	2.0	2.0	256.0
Cleanups	4.0	2 0	0.0
Remedial Action/Release Sites			
Assessments	0.0	0.0	6.0
Cleanups	0.0	1.0	0.0

OR-44305/East Tennessee Technology Park Landlord Decontamination and Decommissioning

Conduct Landlord activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal regulations and DOE Orders for Health and Safety, and maintenance. This account also includes infrastructure support activities that had been funded through overhead accounts prior to FY 1999. This activity is split funded by the Defense Environmental Restoration and Waste Management and the Uranium Enrichment Decontamination and Decommissioning Fund appropriations. (Total FY 2000 funding is $41,136,000.)

- Related subtasks will be completed for the East Tennessee Technology Park infrastructure used to support Environmental Management Program activities including: the East Tennessee Technology Park Electrical Distribution System Reconfiguration and selected bridge refurbishment.
- Design, construction, and planning associated with roof replacements and heating, ventilation, and air conditioning upgrades.
- Issues associated with engineering evaluations for security, classification, piping supports, and other equipment support.
- Infrastructure activities including safeguards and security, utilities, Environmental Safety and Health Program, reindustrialization support and fire protection.

OR-44305	5,226	29,627	16,455

Metrics
No quantifiable corporate performance measures are associated with this project.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
OR-45301/Paducah Remedial Action			
Continue remedial action activities at the Paducah Gaseous Diffusion Plant to address hazardous/solid waste units and reduce the public risk due to extensive groundwater contamination (technicium, trichloroethylene). The cleanup approach is to address potential public risks through source control, plume mitigation, pre-decommissioning, and long-term surveillance and maintenance.			
■ Provide long term surveillance and maintenance of interim groundwater treatment systems, operation and maintenance of interim corrective measures and post-closure monitoring of remedial sites (closed landfills, drainage outfalls, etc); and maintain off-site water policy for affected residents.			
■ Provide decontamination and decommissioning surveillance and maintenance for the C-410 Feed Plant Complex and the C-340 Metals Reduction Plant Complex.			
■ Provide compliance groundwater monitoring well sampling (184 wells) and regulatory reporting.			
■ Conduct remedial investigations for mounds, berms, leak sites, and firing ranges located throughout the plant site; and address contamination within or near ditches, creeks, and a lagoon.			
■ Complete remedial action of LASAGNA™ electro-osmosis technology at the Former Cylinder Drop Test Area; complete record of decision for waste area group 22 uranium burial ground; and additional burial ground and burn area.			
■ Complete proposed plans and feasibility studies for the groundwater operable unit.			
OR-45301	20,020	20,788	20,647

Metrics			
Remedial Action/Release Site			
Assessments	1.0	4.0	6.0
Cleanups	9.0	3.0	1.0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OR-45302/Paducah Gaseous Diffusion Plant Waste Management			
Continue reducing legacy waste inventory through off-site treatment and disposal and implementation of on-site Vortec Vitrification Technology; continue compliant storage activities and restoration-derived waste management; and provide waste management technical and landlord support.			
■ Complete construction of waste storage facilities (C-746-Q and C-733) fire protection upgrades to meet regulatory requirements.			
■ Begin operation of the Vortec Vitrification Technology Demonstration Project for treatment of legacy waste.			
■ Operate and maintain 41,300 square feet of Resource Conservation and Recovery Act, Toxic Substance Control Act, Low Level Waste, and Investigation Derived Waste storage facilities containing 4,900 m^3 of legacy waste; and maintain 26 acres of outside storage areas containing 87,800 m^3 of scrap metal (88% of legacy waste).			
■ Complete removal and disposal of 9,700 tons of scrap metal.			
■ Dispose of 1,000 capacitors contaminated with polychlorinated biphenyls off-site.			
■ Provide limited contract, program management, and support for remedial and waste management activities.			
OR-45302	19,562	15,195	16,853

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Transuranic Waste (TRU)			
Treatment (m^3)	1.0	0.0	0.0
Storage (m^3)	5.0	5.0	6.0
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	188.0	18.0	29.0
Storage (m^3)	4,176.0	4,102.0	3,992.0
Disposal - DOE Onsite/Commercial (m^3)	28.0	14.0	38.0
Disposal - Ship to DOE Disposal Site (m^3)	78.0	76.0	76.0
Low Level Waste (LLW)			
Treatment (m^3)	29.0	7.0	0.0
Storage (m^3)	99,004.0	99,193.0	98,918.0
Disposal - DOE Onsite/Commercial (m^3)	1,681.0	620.0	1,056.0
Disposal - Ship to DOE Disposal Site (m^3)	104.0	0.0	0.0
Hazardous Waste			
Commercial Waste (MT)	0.0	0.0	46.0

OR-46301/Portsmouth Gaseous Diffusion Plant Remedial Action

Complete transition from investigation and interim corrective measures of hazardous/solid waste units to cleanup of on-site groundwater contamination (primarily trichloroethylene) at the Portsmouth Gaseous Diffusion Plant. Groundwater cleanup will employ new technologies for trichloroethylene removal. Activities include closure of remaining Resource Conservation and Recovery Act hazardous waste units, containment and contaminant removal of on-site groundwater plumes, treatment or disposal of legacy waste, and pre-decommissioning and long-term surveillance and maintenance.

- Complete Corrective Measures Initiative design and initiate construction for X-749 Contaminated Materials Disposal Facility/X-120 Old Training Facility, X-744Y Bulk Storage Building/X-744G Storage Yard Soil, X-720 Neutralization Pit & soils, and the X-734 Old Sanitary Landfill groundwater plumes.
- Complete shutdown of the X-622T Groundwater Treatment Facility.
- Complete Risk Reduction Action at the X-700 Chemical Cleaning Facility Chemical and Petroleum Storage Containment Tanks.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
■ Complete design for 5-Unit (X-231 Oil Biodegradation Plots) Groundwater Corrective Measures Initiative.			
■ Provide Decontamination and Decommissioning Surveillance and Maintenance at 5 facilities; Long Term Surveillance and Maintenance groundwater treatment systems; and post-closure monitoring of remediated sites.			
OR-46301	18,978	12,370	20,023
Metrics			
Remedial Action/Release Sites			
Assessments	0.0	5.0	16.0
Cleanups	0.0	4.0	7.0

OR-46302/Portsmouth Gaseous Diffusion Plant Waste Management

Continue reducing legacy waste inventory through off-site treatment and disposal; continue compliant storage activities and restoration-derived waste management; and provide waste management technical and directed support.

- Treat approximately 240,000 pounds of bulk Toxic Substances Control Act liquid stored on-site and approximately 91,000 pounds of mixed waste.
- Characterize 34 waste streams.
- Complete off-site disposal of 125 B-25 boxes of sludge from the X-701B Holding Pond, 600 B-25 boxes of X-616 Effluent Control Facility/Former Chromium Sludge Lagoon sludge disposal at the Hanford Reservation, and disposal of 30 55-gallon containers of Resource Conservation and Recovery Act (F006) listed waste from treatability study.

OR-46302	24,075	22,749	17,477

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Metrics			
Mixed Low-Level Waste (MLLW)			
Treatment (m^3)	51.0	41.0	41.0
Storage (m^3)	9,366.0	8,448.0	7,492.0
Disposal - DOE Onsite/Commercial (m^3)	131.0	0.0	0.0
Disposal - Ship to DOE Disposal Site (m^3)	55.0	956.0	40.0
Low Level Waste (LLW)			
Treatment (m^3)	12.0	79.0	68.0
Storage (m^3)	16,754.0	14,449.0	14,149.0
Disposal - DOE Onsite/ Commercial (m^3)	385.0	159.0	136.0
Disposal - Ship to DOE Disposal Site (m^3)	0.0	2,146.0	164.0

OR-48303/Off-site Remedial Action Decontamination and Decommissioning Fund

Conduct cleanups, groundwater remediation, and provide technical support and conduct landlord activities. These activities are conducted in accordance with the current project baseline for scope, schedule and cost, and are consistent with the Federal regulations and DOE Orders for Health and Safety, and maintenance. The activities are consistent with the Federal Facilities Agreement milestones as agreed with the Environmental Protection Agency for activities under the comprehensive Environmental Response, Compensation, and Liability Act, and consistent with the milestones agreed with the State under the Tennessee Superfund Act. This activity is split funded with the Defense Environmental Restoration and Waste Management and Non-Defense Environmental Management appropriations. (Total FY 2000 funding is $23,839,000.)

- Activities include contract management support, environmental information management, release site evaluations and footprint reduction.

OR-48303	19,670	9,921	8,030

Metrics
No quantifiable corporate performance measures are associated with this project.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
OR-48304/Directed Support			
This activity provides funding for Agreements-in-Principle and grants to support regulator reviews/oversight activities on Oak Ridge Operations Office Environmental Management projects. This activity is split funded between the Uranium Enrichment Decontamination and Decommissioning Fund, the Defense Environmental Restoration and Waste Management, and Non-Defense Environmental Management appropriations. (Total FY 2000 funding is $10,367,000.) ■ Funding of Agreements in Principle with Kentucky and Tennessee. ■ Funding for National Metal Recycle Center of Excellence. ■ Other directed activities.			
OR-48304	3,106	4,150	5,100
Metrics No quantifiable corporate performance measures are associated this project.			
Total, Oak Ridge	190,200	190,200	210,198

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
OR-44301/ETTP Remedial Action	
■ Increase in FY 2000 required because the shipment of stabilized pond sludge to Envirocare of Utah was performed in FY 1999 using reprogrammed carryover funds. Additional increases to perform remediation of K1070 C/D Pond, the G Pit and the K1070-A Contaminated Burial Ground.	13,377
OR-44302/East Tennessee Technology Park Process Equipment Decontamination and Decommissioning	
■ FY 2000 is the first year reflecting full production decommissioning on the 3 building decommissioning contract (3 shifts per day).	15,000

	FY 2000 vs. FY 1999 ($000)
OR-44303/East Tennessee Technology Park Decontamination and Decommissioning	
■ Deactivation and decontamination work at the K-1420, and K-25 buildings and deactivation work on numerous ancillary facilities has increased.	1,836
OR-44305/East Tennessee Technology Park/Landlord - Decontamination and Decommissioning Fund	
■ This reduction reflects infrastructure costs realized through reindustrialization and management and integration contractor initiatives.	-13,172
OR-45301/Paducah Remedial Action	
■ No significant change.	-141
OR-45302/Paducah Waste Management	
■ Ship additional 500 m^3 of Low-Level Waste for offsite disposal.	1,658
OR-46301/Portsmouth Remedial Action	
■ Increase reflects transition from assessment to actual cleanup of groundwater.	7,653
OR-46302/Portsmouth Waste Management	
■ Decrease reflects one-year delay of Mixed Low-Level Waste treatment.	-5,272
OR-48303/Off-site Remedial Action - Decontamination and Decommissioning Fund	
■ Decrease reflects completion of some worker transition activities in FY 1999 and a change in allocation between appropriations.	-1,891
OR-48304/Directed Support	
■ This increase is partially due to additional funding for the National Metal Recycle Center of Excellence and increases in other directed activities.	950
Total Funding Change, Oak Ridge	19,998

Major Issues

The explanation of change reflects the Uranium Enrichment Decontamination and Decommissioning Fund increasing by $19,998,000 from FY 1999 to FY 2000. Because of a one time "credit" of $15,500,000 from the Uranium Enrichment Corporation in late FY 1998 which carried over for use in FY 1999, a total of $205,700,000 was actually available for FY 1999 activities. However, because this "credit" cannot be reflected as budget authority, the growth from FY 1999 ($190,200,000) to FY 2000 ($210,198,000) creates the appearance of a much larger increase.

This credit was associated with a higher than expected quantity of low enriched uranium that the Uranium Enrichment Corporation was able to derive form the dilution of highly enriched uranium transferred by the Department.

Multi-Site

Mission Supporting Goals and Objectives

Program Mission

The Uranium Enrichment Decontamination and Decommissioning Fund supports partial payment of Uranium/Thorium licensee claims, as required under Title X, Subtitle A of the Energy Policy Act of 1992. The Act directs that the Fund be used to reimburse operating uranium or thorium processing site licensees for the costs of their environmental cleanup at those sites, subject to a specific reimbursement limit. This payment is to cover the Federal Government's share of cleanup being carried out at specific active uranium and thorium processing sites. The Department compensates site owners on a per-ton basis for the restoration costs for those tailings attributable to the Federal Government. Due to overall priorities within the Uranium Enrichment Decontamination and Decommissioning Fund (i.e. compliance activities, high priority cleanup actions, etc.), the funding requested only covers a portion of the claims.

Program Goal

To ensure the Federal Government compensates the Uranium/Thorium licensees for the Federal Government's portion of cleanup costs at their sites.

Program Objective

The Uranium and Thorium Reimbursements will be distributed in the spring of 2000 based on approved unpaid claims submitted through FY 1999. Reimbursements will be based on the review and audits of claims submitted by 13 uranium licensees and one thorium licensee.

Performance Measures

Performance measures are provided at an aggregate level after the Funding by Site table as well as at a project level in the Detailed Program Justification.

Significant Accomplishments and Program Shifts

Provide for partial payment of approved Uranium/Thorium (Title X) claims (FY 1998/FY 1999/FY 2000).

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
HQ-4000 / Reimbursements to Uranium and Thorium Licensees under Title X of the Energy Policy Act of 1992	40,000	30,000	30,000	0	>999.9%
Total, UE D&D	40,000	30,000	30,000	0	>999.9%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
HQ-4000/Reimbursements to Uranium and Thorium Licensees under Title X of the Energy Policy Act of 1992			
The project reimburses the operating uranium or thorium processing site licensees for a portion (the Federal material determined to be at each site) of their costs of cleanup.			
■ Provide for partial payment of approved Uranium/Thorium licensee claims for cleanup conducted.			
HQ-4000	40,000	30,000	30,000
Metrics No quantifiable corporate performance measures are associated with this project.			
Total Multi-Site UE D&D	40,000	30,000	30,000

East Tennessee Technology Park Three-Building Decontamination and Decommissioning and Recycling Project, Oak Ridge, Tennessee (OR-44302) [a]

Significant Changes

- The increase in Total Estimated Cost from $272,126,000 to $284,298,000 results from the inclusion of project support costs in the current Total Estimated Cost. These project support costs were previously carried only in the Total Project Cost. This was done to separate the BNFL Inc. project support costs from the cost of the total project. However, since it was necessary to include these project support costs in the Total Estimated Cost. The project support costs include independent verification, technical support, and infrastructure support.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Mobilization Start	Physical Construction Complete		
FY 1999 Budget Request	N/A	N/A	4Q 1997	1Q 2004	272,126	283,866
FY 2000 Budget Request *(Current Baseline Estimate)*	N/A	N/A	4Q 1997	1Q 2004	284,298 [b]	284,298

[a] Project OR-44302 contains additional funding for the period FY 2004 through FY 2008 for decontamination and decommissioning of the K-25 and K-27 buildings. This project covers the decontamination and decommissioning of three of the process buildings (K-29, K-31, and K-33).

[b] Represents the escalated amount of the BNFL Inc. contract ($263,351,887) plus a 3.3 percent contingency for potential fluctuations in the metals market and miscellaneous change orders for a total BNFL Inc. contract amount of $272,126,000. This amount is net of the value of salvage material recovered by BNFL Inc. during decontamination and decommissioning activities, estimated at $61,920,415 ($55,569,748 before escalation). In addition, this estimate includes project support costs of $12,172,000 for fencing, office moves and set-up, contractor interface, independent verification team support, and miscellaneous documents.

2. Financial Schedule (Operating Expense Funded)

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Cost
1997	8,399	8,399	6,937
1998	19,599 [a]	19,599	16,789 [b]
1999	47,500 [c]	47,500	46,364
2000	62,500	62,500	61,544
2001	60,200	60,200	60,212
2002	52,100	52,100	52,102
2003	34,000	34,000	35,058
2004	0	0	5,292

3. Project Description, Justification and Scope

The East Tennessee Technology Park gaseous diffusion process buildings were permanently closed in 1987, and the uranium enrichment mission transferred to the United States Enrichment Corporation at Portsmouth, Ohio and Paducah, Kentucky. The three buildings of the project are filled with diffusion equipment which is contaminated with uranium and which contains barrier material representing a classified technology requiring provisions for security and protection. The three buildings are currently unusable and require continuous surveillance and maintenance activities estimated to cost approximately $80,700,000 for the ten-year period FY 1997 through FY 2006 (estimate taken from *Engineering Evaluation/Cost Analysis*, DOE/OR/02-1579&D1, April 1997).

The challenge for this project is to link the ability to remove equipment/material and to clean up the buildings with some economically viable salvage/recycle of the equipment/material in an effort to lower the overall cost to the government. The cost recovery portion of the project (the equipment and material) requires unique contractor capabilities due to the contamination present, the classified nature of much of the recyclable material, and the limited market for previously-contaminated material.

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[a] The FY 1998 Congressional Budget Request, Volume 5, dated February 1997, pg. 880, cited the subject project, beginning in FY 1997, and was included in the $54,189,000 for the East Tennessee Technology Park (K-25) Decommissioning in FY 1998; includes $1,125,000 of program management support and all funding associated with PBS OR-44302 (UE D&D Fund).

[b] Includes approved Baseline Change Proposals and Option-I, Switchyard Demolition.

[c] Termination liability funding of $3,500,000 obligated to the contract is reflected in FY 1999 appropriation portion of this data sheet. This amount has been obligated to the contract and will be carried year to year, adjusted accordingly, and can not be used unless contract is terminated, or until the end of the project.

The East Tennessee Technology Park Three Building Decontamination and Decommissioning and Recycling Project encompasses buildings K-29, K-31, and K-33. The three buildings contain approximately 45 percent of the five East Tennessee Technology Park Gaseous Diffusion Plant building materials. The following table summarizes the quantity of contaminated or potentially contaminated metal planned to be removed from the facilities, decontaminated and processed as appropriate, and economically recycled.

East Tennessee Technology Park Three Building Decontamination and Decommissioning and Recycling Initiative Quantity Data

	(building)		
	K-29	K-31	K-33
Building Size (Gross Sq. Ft.)	451,000	1,660,000	2,780,000
Metal Quantities for Processing			
Fe Metals (Tons)	10,624	31,678	62,489
Nickel (Tons)	692	1,563	3,752
Copper (Tons)	1,165	2,810	7,036
Aluminum (Tons)	899	2,301	4,140

The scope of the East Tennessee Technology Park Three-Building Decontamination and Decommissioning and Recycle Project includes the following:

- perform decontamination and decommissioning and recycle under fixed-price contract;
- perform surveillance and maintenance services;
- remove all process equipment and materials from the three buildings;
- decontaminate vacant areas within the buildings to industrial reuse standards;
- decontaminate and recycle the majority of materials and equipment;
- disposal of all waste; and,
- provide the buildings ready for industrial occupancy as they are completed.

The three building concept is the beginning of full decontamination and decommissioning of the five East Tennessee Technology Park gaseous diffusion plant buildings. The concept directly supports reindustrialization of East Tennessee Technology Park, which is targeted as a key mission by DOE resulting in accelerated cleanup, cost savings, and indirect benefits to the Oak Ridge work force and community. DOE has signed an agreement with the Community Reuse Organization of East Tennessee to encourage utilization of the East Tennessee Technology Park site. This agreement allows the Community Reuse Organization of East Tennessee to lease East Tennessee Technology Park facilities

from DOE and in turn sub-lease them to outside companies to use them for a variety of activities. The three buildings of the proposed concept will be leased to the Community Reuse Organization of East Tennessee, one by one, as soon as building decontamination is completed.

The intent of this project is to find the best economical match between the government's desire to have the three buildings cleaned up and available for alternative use, and to minimize the overall cost of accomplishing the task. BNFL Inc., in fulfilling this charge, brings their expertise in cleaning up similar diffusion facilities in Great Britain and industrial contacts, to take over the surveillance and maintenance of the buildings, execute cleanup, and tailor the entire process to minimize the quantity of material shipped for disposal. The decontamination and recycle enterprises will be negotiated and established by BNFL Inc. Recyclable materials will be recovered and delivered to these enterprises in forms that meet the acceptance, and fulfill the specialized and focused needs of BNFL Inc.'s business associates.

In this concept, BNFL Inc. and its subcontractors have expertise in each of the decontamination and decommissioning, recycle and waste disposal areas needed to perform the scope of work described above. BNFL Inc. was selected through a competitive process whereby an announcement was published in the Commerce Business Daily requesting expressions of interest from all parties desiring to perform the decontamination and decommissioning of the three process buildings. Several responses were received, but only BNFL Inc.'s met all the terms set forth in the published announcement. Therefore, BNFL Inc. was awarded a fixed price contract for delivering vacant and decontaminated buildings to DOE/Oak Ridge Operations. The work will be performed utilizing external licensing by the Tennessee Department of Environment and Conservation (which has Nuclear Regulatory Commission oversight responsibilities in Tennessee) and under the Office of Safety and Health Administration rules (off-site) and DOE oversight (on-site) utilizing Work Smart Standards.

In this approach, savings occur (estimated at approximately $500 million over the traditional Management and Operating approach) due to a combination of efforts including (1) reduced engineering and management overhead and fees, (2) reduced surveillance and maintenance cost, (3) efficiencies in the approach to recycle and building decontamination based on BNFL Inc.'s successful experiences at Capenhurst, (4) reduced contingency due also to BNFL Inc.'s experience and confidence based on Capenhurst decontamination and decommissioning, and (5) DOE's assignment of all materials in the three buildings to BNFL Inc. In return for these benefits, BNFL Inc. takes responsibility for recycle/salvage activities through whatever means BNFL Inc. selects, including waste containers or other products fabricated from recycled metal. BNFL Inc. is following an approach that disposes of more low-valued metal than in the previous approach; and BNFL Inc. is using the least-net-cost method for decontamination and recycle of other assets.

Additional benefits to the Department from the East Tennessee Technology Park Three Building Decontamination and Decommissioning and Recycle Project include:

- Reduced risk to the public, workers, and the environment by accomplishing decontamination and decommissioning of the buildings sooner than planned. Risk is related to the deposited uranium products left in the gaseous diffusion plant systems at shut-down, coupled with the fact that neither the systems nor buildings are designed for long-term storage of nuclear materials.
- Risk is assumed by the contractor during cleanup, including risks of waste handling and disposal.

- Removal of process systems eliminates fissile material hold-up, as well as risk of potential criticality accidents. This is consistent with requirements within the Defense Nuclear Facilities Safety Board 94-1 Implementation Plan.
- The approach leaves buildings standing that will be used by DOE and the Community Reuse Organization of East Tennessee in efforts to reindustrialize East Tennessee Technology Park.
- The approach results in the further establishment and verification of efficient decontamination and decommissioning methods that will be made available to DOE for use at other facilities.
- The risk in achieving this project is low based on substantial planning by DOE and past performance by BNFL Inc. Further, incidental benefits include the establishment of equipment/metal decontamination and recycle capabilities in Oak Ridge which will maintain jobs in the region. BNFL Inc.'s approach allows for Management and Operating worker transition to the private sector and will create approximately 350 replacement jobs.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
None	0	0
Total, Engineering, Design, Inspection, and Administration of Construction Costs	0	0
Construction Phase		
Removal cost less salvage (BNFL contract)	263,352	263,352
Project Support Costs (4.5% of TEC)	12,172 [a]	0
Total, Construction Costs	275,524	263,352
Contingencies		
Construction Phase (3.3% of the TEC)	8,774	8,774
Total, Costs (TEC)	284,298 [b]	272,126

The National Academy of Sciences recommendation (*Affordable Cleanup?*, February 1996) included a least cost scenario to accomplish the East Tennessee Technology Park gaseous diffusion plant decontamination and decommissioning program. While the National Academy of Sciences did not intend for the *Affordable Cleanup?* document to represent a detailed cost estimate, a scaling exercise is

[a] The project support costs were included in the previous Total Project Cost. They were not included in the previous Total Estimated Cost in order to separate the BNFL Inc. contract costs from the cost of the total project. However, since the project support costs must be included in the appropriation amounts, it was necessary to include them in the Total Estimated Cost.

[b] This estimate for the contracting approach is expected to provide a cost savings/avoidance of approximately $500 million compared to the traditional Management and Operating approach.

included that bounds the five-building cleanup in the range from $510,770,000 to $935,960,000. This bound can be pro-rated to a three-building bound with the range from $204,308,000 to $374,484,000 with a mid-point of $289,396,000. These estimates are unescalated dollars, the mid-point amount escalated is $321,438,000.

5. Method of Performance

BNFL Inc. will finance the project; design the decontamination facilities; apply for and receive required permits and licenses; construct necessary facilities and bring them on-line; operate the facilities to decontaminate metals and equipment; salvage metal and equipment; and deactivate the decontamination facilities. BNFL Inc. will recover the resources it has invested both through recycle activities and through the delivery of vacated and decontaminated building space paid for by DOE on a fixed-unit-price basis. The underlying intent is to transfer the primary share of the financial, performance, and operational responsibility from the government to BNFL Inc.

DOE will request sufficient annual appropriations to cover the anticipated scope of work to be performed by BNFL Inc. and necessary support costs such as independent verification support, with an appropriate rate of return in the event the contractor defaults or DOE chooses to cancel for government convenience. Provisions will be included in the contract to ensure that current year work scope is limited to the available funding within the contract. Additional liabilities for a government termination for convenience would amount to approximately $3,500,000 for demobilization and cleanup of the decontamination and decommissioning workshop, and relocation and severance pay for affected employees. Should termination occur, the additional funding would be identified within the then current funding at the Oak Ridge Operations Office.

The total cost of the decontamination and decommissioning, recycling and waste disposal is larger than the value of the material and products that can be removed from the three buildings by approximately $272,126,000 which reflects the governments contractual liability. The contractor will incur substantial up-front expenses such as design and construction of a disassembly and size reduction workshop to be located on-site, and design and construction of a nickel electro-refining facility (located either on-site or off-site). Payments to the contractor are to be consistent with services provided, e.g. areas of the buildings cleaned of equipment and material. The payments will be made from annual appropriations based on: (1) the original obligation for the contractor's start-up costs, (2) amortization of the contractor's capital costs, (3) removal and decontamination of equipment/material, (4) recycling of materials, (5) decontamination of the buildings, and (6) disposal of wastes.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Project Cost						
Facility Cost						
Design	0	0	0	0	0	0
Construction	6,937	16,789	46,364	61,544	162,664	284,298
Total Facility Cost	6,937	16,789	46,364	61,544	162,664	284,298
Other Project Cost						
Conceptual design costs	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	0	0	0	0	0	0
Total other project costs	0	0	0	0	0	0
Total, Project Costs	6,937	16,789	46,364	61,544	162,664	284,298
LESS: Non-Federal contribution	0	0	0	0	0	0
Total Project Cost (TPC)	6,937	16,789	46,364	61,544	162,664	284,298

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility operating costs	N/A	N/A
Annual Facility maintenance and repair costs	N/A	N/A
Total related annual funding*	N/A	N/A

*Because this is not a construction project, there are no related annual maintenance and repair costs.

8. Background Issue

This contract is a negotiated fixed-price contract with BNFL Inc. to cleanup three of the five gaseous diffusion buildings at East Tennessee Technology Park. BNFL Inc. will provide sufficient financing until elements of performance are completed, i.e., portions of the buildings are cleaned up. Payments will be made to BNFL Inc. upon completion of equipment removal from individual portions of the buildings and other payments after each building is decontaminated. The offset from the recycling initiative, based on fair market value, is adjustable if prices as indexed on the American Metals Market fluctuate more

than five percent from the prices negotiated as part of the contract. Changes above or below five percent shall be split between DOE and the contractor. This will occur seventeen times in the course of the contract.

9. Contracting Authority

The authority for DOE to enter into this contract is found at 42 U.S.C. § 7256(c). Authority for the Department of Energy to offset against the contract price paid to BNFL Inc. the cost of proceeds that BNFL Inc. receives from the sale of property it acquires as partial consideration for the contract work is found in Subpart 37.3, "Dismantling, Demolition, or Removal of Improvements" of the Federal Acquisition Regulation and in 40 U.S.C. § 485(e) of the Federal Property and Administrative Services Act of 1949, as amended.

Authority for the Federal Acquisition Regulation Subpart 37.3 is found in 40 U.S.C. § 486(c). See 48 Federal Register 42365 (Sept. 19, 1983). The Federal Acquisition Regulation Subpart 37.3 provides that when the Government pays a contractor to dismantle or demolish structures, in further consideration of contract performance, title to property to be dismantled or demolished may be transferred to the contractor and the value of this property will be considered when determining payment to the contractor. See Federal Acquisition Regulation 37.303; Federal Acquisition Regulation 37.304(a); Federal Acquisition Regulation 52.237-4. Federal Acquisition Regulation Subpart 37.3 is applicable to this contract because the contract requires BNFL Inc. to dismantle, demolish and remove the interiors of the three process buildings at East Tennessee Technology Park. In consideration for this work, BNFL Inc. will receive a fixed price and title to the property in the three process buildings. BNFL Inc. intends to recycle and sell a certain amount of this property. The fixed price paid by DOE will reflect credit of a dollar amount that the parties agree reflects the expected value of the recycled property; i.e., the proceeds received by BNFL Inc. from the sale of the property it has received as partial consideration for its work under the contract.

40 U.S.C. § 485(a) provides that proceeds from any "disposition of surplus property" shall be sent to the Treasury as miscellaneous receipts unless one of the exceptions set forth in 40 U.S.C.§ § 485(b), (c), (d) or (e) is applicable. Section 485(e) is applicable to the use of proceeds from the disposition of property by BNFL Inc. under the contract. This section provides that "any contract" entered into by an executive agency such as DOE may authorize that "any sale of property in the custody of the contractor . . . be credited to the cost or price of the work covered by such contract . . ." DOE therefore may credit the proceeds from the sale of property provided to BNFL Inc. under this Decontamination and Decommissioning contract as partial consideration for the contract work against the total fixed price paid by DOE to BNFL Inc.

DOE and BNFL Inc. anticipate that the property to be provided to BNFL Inc. as partial consideration for BNFL Inc.'s work will contain metals that can be recycled and subsequently sold. However, since DOE and BNFL Inc. expect that most of these metals are contaminated with radionuclides and other substances (e.g., PCBs) and many are in a classified configuration, the metals must be decontaminated and declassified before they can be recycled. Most of the fixed contract price will reflect the considerable decontamination and associated work that must be performed by BNFL Inc. This work

therefore is deemed to be outside the intent of the language under the section entitled "Use of Receipts From Leasing or Selling Government Property or Assets" in Title III of both the Energy and Water Development Appropriations Bill, 1997 (H. R. Rep. 104-679) and the Conference Report entitled "Making Appropriations for Energy and Water Development For The Fiscal Year Ending September 30, 1997, And For Other Purposes" (H. R. Rep.104-782).

The DOE/Oak Ridge Operations Contracting Officer for the East Tennessee Technology Park Three-Building Decontamination and Decommissioning and Recycling Project has evaluated and deemed it to be in the Best Interest of the Government to utilize the property generated by the dismantling and demolition activities as part of the compensation to be provided the contractor for Decontamination and Decommissioning services. The reasons for utilizing this concept and subsequent determination are as follows:

- DOE has legal authority to enter into this contract.
- The intent of this project is to find the best economical match between the government's desire to clean the three buildings up and to minimize the overall cost of the task.
- The cost recovery aspects of the equipment and material in the project are not readily available due to the contamination present, the classified nature of much of the material, and the limited market for previously contaminated material.
- The material has no value in the current state of contamination and the government has no use for the material.
- The expertise of BNFL Inc. in cleaning up similar diffusion facilities in Great Britain, their financial backing, and their industrial contacts.
- BNFL Inc. will negotiate and establish decontamination and recycle enterprises. Recyclable materials will be recovered and delivered to these enterprises in forms that meet the acceptance and fulfill the specialized and focused needs of BNFL Inc.'s business associates.
- DOE/Oak Ridge Operations does not have the expertise in house to recycle and market this material at a comparable cost. Substantial investment would be required , either in-house or through a separate contract to accomplish the same task.

10. Project Status (as of December 31, 1998)

- BNFL assumed responsibility for Buildings K-31 and K-33 on January 5, 1998 and Building K-29 on July 1, 1998.
- BNFL started process equipment dismantlement and removal on July 1, 1998.
- BNFL awarded Option-I, Dismantlement and Removal of K-31 and K-33 Switchyards, for net DOE cost of $196,432.
- Overall cleanup of K-33 is in excess of 15 percent complete.

- Completed Milestone No. 1 on schedule and Milestone No. 2 four months behind schedule.
- Completed 55 percent of Switchyard demolition.
- Shipped nine PCB 33,000-pound transformers to a licensed treatment/disposal facility.
- Started shipping low-level waste to Envirocare.
- Shipped 815,000 pounds of K-33 metal for unrestricted release off site.
- Shipped 118,000 pounds of K-33 metal to MSC Kerr Hollow Facility for decontamination and recycle.
- Shipped 3,725,500 pounds of Switchyard metals for unrestricted reuse off site.
- BNFL/MSC started construction of the disassembly and size reduction workshop in K-33.
- Oak Ridge has negotiated and approved four baseline change proposals totaling $3,845,960.

DOE/CR-0065
Volume 6

Department of Energy
FY 2000 Congressional Budget Request

Southeastern Power Administration
Southwestern Power Administration
Western Area Power Administration
Bonneville Power Administration

February 1999

Office of the Chief Financial Officer

Volume 6

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The Department of Energy's FY 2000 Congressional budget justification will be available on the CFO homepage at http://www.cfo.doe.gov/budget/00budget/index.htm

Appropriation Summary

	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Energy and Water Development Appropriations					
Energy supply	950,417	787,091	841,888	54,797	7 0%
Uranium supply & enrichment activities	-3,535	—	—	—	—
Non-defense environmental management	505,181	431,200	330,934	-100,266	-23.3%
Uranium enrichment D&D fund	230,200	220,200	240,198	19,998	9 1%
Science	2,260,174	2,697,860	2,835,393	137,533	5 1%
Departmental administration	133,280	73,945	123,490	49,545	67 0%
Office of the inspector general	27,500	29,000	30,000	1,000	3.4%
Atomic energy defense activities:					
Weapons activities	4,146,692	4,400,000	4,531,000	131,000	3.0%
Defense environmental restoration & waste management	4,424,660	4,320,567	4,505,676	185,109	4 3%
Defense facilities closure projects	890,800	1,041,740	1,054,492	12,752	1.2%
Environmental management privatization	200,000	228,357	228,000	-357	-0 2%
Other defense activities	1,695,867	2,221,676	1,792,000	-429,676	-19 3%
Defense nuclear waste disposal	190,000	189,000	73,000	-116,000	-61 4%
Total, Atomic energy defense activities	11,548,019	12,401,340	12,184,168	-217,172	-1.8%
Power marketing administrations	243,619	237,510	199,947	-37,563	-15 8%
Federal energy regulatory commission	—	—	—	—	—
Nuclear waste disposal	156,000	169,000	297,000	128,000	75 7%
Geothermal resources development fund	—	—	-821	-821	—
Total, Energy and Water Development Appropriations	16,050,855	17,047,146	17,082,197	35,051	0 2%

Appropriation Summary

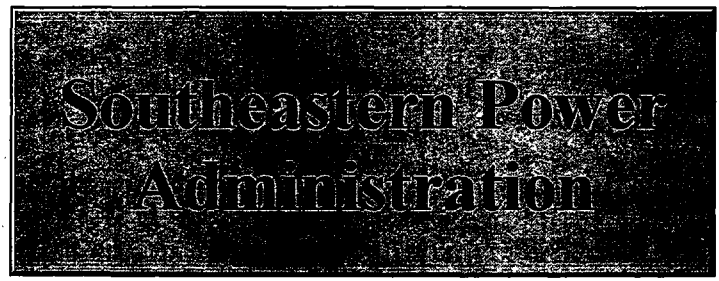
	FY 1998 Current Approp	FY 1999 Current Approp	FY 2000 Request to Congress	FY 2000 Request vs FY 1999	
Interior and Related Agencies Appropriations					
Fossil energy research and development	356,517	384,056	364,000	-20,056	-5 2%
Alternative fuels production	-1,500	-1,300	-1,000	300	23.1%
Naval petroleum and oil shale reserves	107,000	14,000	——	-14,000	-100.0%
Elk Hills school lands fund	——	36,000	36,000	——	——
Energy conservation	584,354	627,701	837,515	209,814	33 4%
Economic regulation	2,725	1,801	2,000	199	11 0%
Strategic petroleum reserve	207,500	160,120	164,000	3,880	2.4%
Energy information administration	66,800	70,500	72,644	2,144	3.0%
Clean coal technology	-101,000	-40,000	-246,000	-206,000	-515.0%
Total, Interior and Related Agencies Appropriations	1,222,396	1,252,878	1,229,159	-23,719	-1.9%
Uranium enrichment D&D fund discretionary payments	-388,000	-398,088	-420,000	-21,912	-5.5%
Excess fees and recoveries, FERC	-10,159	-29,446	-28,342	1,104	3 7%
Colorado river basin	-16,098	-16,098	-21,000	-4,902	-30.5%
Total, Department of Energy	16,858,994	17,856,392	17,842,014	-14,378	-0 1%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
...elopment Activities				
Energy Supply	1,536	1,629	1,331	-18.3%
Science	263	318	325	2.2%
Atomic Energy Defense Activities				
Weapons Activities	1,837	1,876	1,799	-4.1%
Environmental Restoration & Waste Mgmt	2,782	2,764	2,697	-2.4%
Other Defense Activities	846	736	964	31.0%
Total Atomic Energy Defense Activities	5,465	5,376	5,460	1.6%
Departmental Administration	1,258	1,302	1,303	0.1%
Inspector General	245	266	257	-3.4%
Power Marketing Administration	4,253	4,347	4,309	-0.9%
Federal Energy Regulatory Commission	1,318	1,320	1,320	-0.0%
	202	197	196	-0.5%
...es	14,540	14,755	14,501	-1.7%

Staffing Summary

	FTEs			%
	FY 1998	FY 1999	FY 2000	Change
Interior and Related Agencies				
Clean Coal Technology	61	67	60	-10.4%
Fossil Energy Research & Development	660	679	681	0.3%
Naval Petroleum & Oil Shale Reserves	59	54	39	-27.8%
Energy Conservation	419	441	426	-3.4%
Economic Regulation	22	17	16	-5.9%
Strategic Petroleum Reserve	132	135	125	-7.4%
Energy Information Administration	382	378	371	-1.9%
Total, Interior & Related Agencies Activites	1,735	1,771	1,718	-3.0%
Total, Department of Energy	16,275	16,526	16,219	-1.9%


Southeastern Power
Administration

Southeastern Power Administration

Proposed Appropriation Language

[For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, $8,594,000, to remain available until expended; in addition, notwithstanding the provisions of 31 U.S.C. 3302, not to exceed $28,000,000 in reimbursements, $20,000,000 for transmission wheeling and ancillary services and $8,000,000 for power purchases at the Richard B. Russell Project, to remain available until expended.]

Explanation of Change

No appropriation language is necessary for FY 2000 because sufficient prior year funds are available. The customers of Southeastern will be required to fund their own purchase power and transmission wheeling agreements beginning in FY 2000.

Southeastern Power Administration

Executive Budget Summary

Program Mission

The mission of Southeastern Power Administration (Southeastern) is to market federal hydroelectric power at the lowest possible cost to public bodies and cooperatives in the southeastern United States in a professional, innovative, customer-oriented manner, while continuing to meet the challenges of an ever-changing electric utility environment through continuous improvement. The vision of Southeastern is to advance clean, responsible, reliable power.

Southeastern markets power produced at 23 Corps of Engineers constructed projects, to customers in 11 southeastern states giving preference in the sale of power to public bodies and cooperatives in accordance with the Flood Control Act of 1944.

Southeastern does not own or operate any transmission lines. In the absence of transmission lines of its own, transmission functions are accomplished through arrangements between Southeastern's customers and each of the area utilities with transmission lines connected to the projects, under which the utility agrees to deliver specified amounts of Federal power to customers of the Government.

Beginning in FY 2000, the Southeastern Power Administration will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of the Southeastern Power Administration will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that results from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by the Southeastern Power Administration.

Program Goals

- Encourage widespread use of available Federal power giving preference in the sale of power to public bodies and cooperatives.
- Promote energy and economic efficiency among preference customers.
- Make the power available at the lowest possible rates to consumers consistent with sound business principles while repaying the Federal investment in a timely manner.
- Operate projects as an integrated system to provide maximum power contribution in meeting area power requirements.
- Expand training programs of associates that maximize their contribution to organization's vision and mission.
- Make maximum use of available technology.
- Enhance and increase organizational communications and quality.

Program Objectives

- Actively participate in electric industry issues. Demonstrate a willingness to change policy, contracts, and operating procedures to be more responsive to our customers.
- Accomplish timely repayment and collections for power delivered to customers. Work with customers and Corps of Engineers to monitor costs and to work toward cost containment.
- Formulate power rates to recover all costs of producing power, including amortization of capital investment allocated to power, over a 50-year period and replacements over the service lives up to a maximum of 50 years.
- Continue to administer approximately 300 contracts which benefit more than 500 customers in a fair and effective manner that carries out the intent of contract provisions. This includes power delivery to the busbar, contract service, billing and collection functions and daily coordination of reservoir operations to maximize power output and meet firm power commitments.
- Southeastern continues to promote effective methods for customers to implement energy and economically efficient strategies that take advantage of new marketing options in a deregulated environment through the Competitive Resource Strategies Program.
- Continue coordination with Corps of Engineers, preference customers, and other interested parties in the rehabilitation and upgrade of existing and new projects and in competing uses of water.
- Continue to coordinate, schedule and dispatch power system generation to maximize power benefits through improved technology to the electric grid and the preference customers through hourly communication and coordinated working relationships with various electric utilities. Continue to account and provide summaries of power transactions for the appropriate and timely power billing function of the Agency.

Strategy

- Southeastern continues to take the lead in fostering communications with its power sales customers and the Corps of Engineers through two previously established partnerships - the Southeastern Federal Power Alliance and Team Cumberland.
- Competing demands for water allocation are expected to intensify and impact the power potential of projects for which Southeastern has marketing responsibility. Discussions, studies, and meetings with preference customers, Corps of Engineers, and other affected groups will continue as Southeastern carries out its responsibility to ensure that the power interest is heard.

Major Changes

- Beginning in FY 2000, the Southeastern Power Administration will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of the Southeastern Power Administration will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that results from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by the Southeastern Power Administration.
- Southeastern continues to revise its Strategic Plan. The plan outlines the goals and objectives Southeastern anticipates implementing during the next five years.
- Southeastern expanded its capability to schedule the hourly generation of the hydroelectric projects by improving communications with the individual projects in Southeastern's marketing area.
- Southeastern's total quality process continues with associates receiving training in the areas of team building and process improvement techniques. Southeastern's efforts in Total Quality Management have improved customer service.
- The Competitive Resource Strategies Program has begun to focus on competitiveness issues that have evolved over the past several years as well as new initiatives. The competitiveness issues resulted from the passage of the Energy Policy Act of 1992 and subsequent implementing orders, which directed Southeastern and it's preference customers toward a competitive market. In cooperation with preference customers, state associations and Federal entities, Southeastern co-sponsors cost shared workshops to help its customers address issues surrounding the implementation of energy efficiency programs in a competitive market.
- The FY 2000 budget request discontinues an approach of using customer reimbursements to pay for transmission wheeling and ancillary services needed to deliver power to some preference customers and to pay for power purchases.
- Southeastern's rates recover the full cost of the Civil Service Retirement System and Post-Retirement Health Benefits for its employees and the U. S. Army Corps of Engineers power related employees. The estimated increase in receipts to the Treasury is $3,000,000 annually.

Site Funding and Federal and Contractor Staffing Profiles

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Program Direction	4,463 [a]	4,370	4,727
Purchase Power & Wheeling	11,149 [b]	6,130	0
Subtotal, Southeastern	15,612	10,500	4,727
Use of prior year balances	-4,000	-3,000	-5,500
Total	11,612	7,500	-773 [c]
Full Time Equivalents	41	41	42
Contractor Staffing	0	0	0

[a]Reprogramming of $150,000 from Purchase Power & Wheeling to Program Direction.

[b]Funds of $610,000 transferred to Southwestern for accounting system.

[c]Proposed appropriation transfer to Southwestern Power Administration.

Program Performance Measures

Performance measures indicate the financial, operating, and rate performance of Southeastern Power Administration when compared to other standards that serve as a proxy for normal performance.

- Repayment of the Federal investment:
  - Meet planned repayment of principal on Power Investment.
- Measure the safety performance by measuring the safety record against the industry average.
  - Achieve a safety performance of at most a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked, or the Bureau of Labor Statistics industry rate, whichever is lower.
- Measure the control area performance.
  - Ensure that each power system control area operated by a Power Marketing Agency (PMA) receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Reliability Council performance standard.

Charles A. Borchardt — Date

Administrator, Southeastern Power Administration

Southeastern Power Administration

Program Mission

The mission of Southeastern Power Administration (Southeastern) is to market federal hydroelectric power at the lowest possible cost to public bodies and cooperatives in the southeastern United States in a professional, innovative, customer-oriented manner, while continuing to meet the challenges of an ever-changing electric utility environment through continuous improvement. Southeastern markets hydroelectric power in the states of West Virginia, Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Illinois and Kentucky. Southeastern's vision is to advance clean, responsible, reliable power.

Southeastern markets power produced at 23 Corps of Engineers constructed projects, to customers in 11 southeastern states giving preference in the sale of power to public bodies and cooperatives in accordance with the Flood Control Act of 1944

Southeastern does not own or operate any transmission lines. In the absence of transmission lines of its own, transmission functions are accomplished through arrangements between Southeastern's customers and each of the area utilities with transmission lines connected to the projects, under which the utility agrees to deliver specified amounts of Federal power to customers of the Government.

Beginning in FY 2000, the Southeastern Power Administration will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of the Southeastern Power Administration will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that results from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by the Southeastern Power Administration.

Program Goals

- Encourage widespread use of available Federal power giving preference in the sale of power to public bodies and cooperatives.
- Promote energy and economic efficiency among preference customers.
- Make the power available at the lowest possible rates to consumers consistent with sound business principles while repaying the Federal investment in a timely manner.
- Operate projects as an integrated system to provide maximum power contribution in meeting area power requirements.
- Expand training programs of associates that maximize their contribution to organization's vision and mission.
- Make maximum use of available technology.
- Enhance and increase organizational communications and quality.

Program Objectives

- Actively participate in electric industry issues. Demonstrate a willingness to change policy, contracts, and operating procedures to be more responsive to our customers.
- Accomplish timely repayment and collections for power delivered to customers. Work with customers and Corps of Engineers to monitor costs and to work toward cost containment.
- Formulate power rates to recover all costs of producing and transmitting power, including amortization of capital investment allocated to power, over a 50-year period and replacements over the service lives up to a maximum of 50 years.
- Continue to administer approximately 300 contracts which benefit more than 500 customers in a fair and effective manner that carries out the intent of contract provisions. This includes power delivery to the busbar, contract service, billing and collection functions and daily coordination of reservoir operations to maximize power output and meet firm power commitments.
- Southeastern continues to promote effective methods for customers to implement energy and economically efficient strategies that take advantage of new marketing options in a deregulated environment through the Competitive Resource Strategies Program.
- Continue coordination with Corps of Engineers, preference customers, and other interested parties in the rehabilitation and upgrade of existing and new projects and in competing uses of water.
- Continue to coordinate, schedule and dispatch power system generation to maximize power benefits through improved technology to the electric grid and the preference customers through hourly communication and coordinated working relationships with various electric utilities. Continue to account and provide summaries of power transactions for the appropriate and timely power billing function of the Agency.

Performance Measures

Performance measures indicate the financial, operating, and rate performance of Southeastern Power Administration when compared to other standards that serve as a proxy for normal performance.

- Repayment of the Federal investment:
  - Meet planned repayment of principal on Power Investment.
- Measure the safety performance by measuring the safety record against the industry average.
  - Achieve a safety performance of at most a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked, or the Bureau of Labor Statistics industry rate, whichever is lower.
- Measure the control area performance.
  - Ensure that each power system control area operated by a Power Marketing Agency (PMA) receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Reliability Council performance standard.

Significant Accomplishments and Program Shifts

- Beginning in FY 2000, the Southeastern Power Administration will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of the Southeastern Power Administration will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that results from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by the Southeastern Power Administration. In addition, Southeastern discontinues the approach of using customer reimbursements and net billing to pay for transmission wheeling and ancillary services needed to deliver power to some preference customers and to pay for power purchases.
- Southeastern continues to take the lead in fostering communications with our customers and the Corps of Engineers through two previously established partnerships - the Southeastern Federal Power Alliance and Team Cumberland. The Southeastern Federal Power Alliance provides suggestions which enable the Agency to identify changing customers needs. Both partnerships meet periodically to exchange information and promote their visions.
- Southeastern expanded its capability to schedule hourly generation of the hydroelectric projects in Southeastern's marketing area.
- Southeastern's efforts in Total Quality Management continue to lead us in improved processes and customer service.
- Southeastern's Competitive Resource Strategies Program provides energy efficiency and competitiveness education and training opportunities to preference customers. Southeastern also maintains close contact with Generation and Transmission Cooperatives, Joint Action Agencies,

and customer associations across the Southeast to assess the need and scope of new training initiatives.

- Southeastern continues to revise its Strategic Plan. The plan outlines the requirements under GPRA and DOE's plan that Southeastern anticipates implementing during the next five years.
- In FY 1998, Southeastern marketed 8,610 GWH of clean renewable hydroelectric energy for $168,993,562 in revenues providing total proprietary receipts of $141,107,963. Southeastern anticipates proprietary receipts of $133,090,000 for FY 1999, and $129,457,000 for FY 2000.
- Southeastern's rates recover the full cost of the Civil Service Retirement System and Post-Retirement Health Benefits, for its employees and the U. S. Army Corps of Engineers power related employees that Southeastern began to recover in 1998. The estimated increase in receipts to the Treasury is $3,000,000 annually.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Program Direction [a]	4,463	4,370	4,370	4,370	4,727
Purchase Power & Wheeling [b]	11,149	6,130	6,130	6,130	0
Subtotal, Southeastern Power Administration	15,612	10,500	10,500	10,500	4727
Use of prior year balances	-4,000	-3,000	-3,000	-3,000	-5,500
Total, Southeastern Power Administration	11,612	7,500	7,500	7,500	-773 [c]

Public Law Authorizations:

Pub. Law 78-534, "Flood Control Act of 1944"

Pub. Law 95-91, "DOE Organization Act of 1977, Section 302"

Pub. Law 102-485, "Energy Policy Act of 1992"

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[a]Reprogramming of $150,000 from Purchase Power & Wheeling to Program Direction in FY 1998.

[b]Funds of $610,000 transferred to Southwestern Power Administration for accounting system.

[c]Proposed Appropriation transfer to Southwestern Power Administration.

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Southeastern Power Administration	15,612	10,500	4,727	-5,773	-55%
Use of prior year balances	-4,000	-3,000	-5,500	-2,500	83%
Transfer to Southwestern Power Administration	0	0	773	773	
Total, SEPA	11,612	7,500	0	-7,500	-100%

Site Description

Southeastern is one of the Department of Energy's Power Marketing Administrations. Southeastern is located in Elberton, Georgia, and has no field offices. Southeastern markets power produced at 23 Corps of Engineers constructed projects, to customers in 11 southeastern states giving preference in the sale of power to public bodies and cooperatives in accordance with the Flood Control Act of 1944.

Purchase Power and Wheeling

Mission Supporting Goals and Objectives

Beginning in FY 2000, the Southeastern Power Administration will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of the Southeastern Power Administration will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that results from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by the Southeastern Power Administration.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Purchase Power and Wheeling	11,149	6,130	0	-6,130	-100%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Purchase Power and Wheeling			
■ Payment of transmission service charges for delivery of power over non-Federal Systems and ancillary services.	21,009	21,009	0
■ Purchase of energy to pump water into the Richard B. Russell Project for later release..	5,300	8,000	0
■ Purchase of energy to pump water into the Carters Project for later release..	3,240	3,521	0
■ Purchase of default energy.	1,000	1,000	0
■ Purchase support capacity and firming energy required to meet commitments for the Jim Woodruff project due to adverse water conditions. Adverse water conditions can occur in times of drought or flood.	600	600	0
■ Reimbursements are funds collected by Southeastern from its customers for transmission and ancillary services, and for purchase power	-20,000	-28,000	0
Total, Southeastern Power Administration - Purchase Power and Wheeling	11,149	6,130	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Purchase Power and Wheeling	
■ Purchase Power and Wheeling Program discontinued due to policy change. Beginning in FY 2000, Southeastern will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of Southeastern will be required to fund their own power purchases and transmission agreements. Power receipt estimates have been reduced to reflect the reduced spending by Southeastern.	-6,130

Southeastern Power Administration Program Direction

Mission Supporting Goals and Objectives

Program direction provides for: (1) scheduling the generation of power and supervision of power deliveries; (2) negotiation and administration of contracts for the sale of power and energy and establishment of rates to assure repayment of power costs; (3) general administration and support of Southeastern's power marketing program; and (4) Competitive Resource Strategies Program. We coordinate and cooperate with our partners to operate projects in a manner that enhances the value and reliability of hydropower. Priority is given to integrating environmental concerns and determinations into program actions. Emerging energy efficiency technologies are integrated with marketing strategies and programs.

Southeastern's FTE activities and percentages are provided as follows:

7% The Office of the Administrator is responsible for marketing hydroelectric power and energy and includes the office of Legal Affairs.

27% The Finance and Marketing Division negotiates, prepares and administers contracts for the sale of power, formulates rates to meet repayment requirements, is responsible for budget, accounting and financial management activities, customer service, and the Competitive Resource Strategies Program.

32% The Human Resource and Administration Division plans, develops, coordinates administrative and management activities of Southeastern. It includes activities to support mission accomplishment, information management (IM) (formerly ADP) and telecommunication services, public information program, personnel, contracts and procurement, supply, security, technical library, facilities, and strategic planning.

34% The Power Resources Division monitors and forecasts power production to determine the amounts of available power and energy and evaluates methods of coordinating operation of present and proposed generating plants to obtain maximum utilization of water and power resources. This division coordinates, schedules, and dispatches system power generation on an hourly basis and is responsible for administering contractual operation requirements and performs billing operations for power sold by Southeastern.

As of September 30, 1997, the projects represent a cumulative Federal investment, including replacements of $1,494,838,297. Through FY 1997, $581,856,629 has been repaid in addition to $932,562,269 in interest. In FY 1998, 8,610 GWH of hydroelectric energy were marketed for $168,993,562 in revenues providing total proprietary receipts of $141,107,963. Receipts are expected to be $133,090,000 in FY 1999, and $129,457,000 in FY 2000.

Performance Measures

Performance measures indicate the financial, operating, and rate performance of Southeastern Power Administration when compared to other standards that serve as a proxy for normal performance.

- Repayment of the Federal investment:
  - Meet planned repayment of principal on Power Investment.
- Measure the safety performance by measuring the safety record against the industry average.
  - Achieve a safety performance of at most a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked, or the Bureau of Labor Statistics industry rate, whichever is lower.
- Measure the control area performance.
  - Ensure that each power system control area operated by a Power Marketing Agency (PMA) receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Reliability Council performance standard.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salary and Benefits	2,669	2,693	2,863	+170	+6.3%
Travel	200	195	220	+25	+12.8%
Support Services	258[a]	75	125	+50	+40.0%
Other Related Expenses	1,336[b]	1,407	1,519	+112	+8.3%
Total	4,463	4,370	4,727	+357	+8.2%
Full Time Equivalents	41	41	42	1	2.0%

[a]This amount includes $83,000 reprogrammed for consulting services for the new accounting system.

[b]This amount includes $67,000 reprogrammed for computer equipment necessary to support the new accounting system.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Negotiation, preparation, execution, and administration of all contracts for the disposition of electric power and to insure and maintain continuity of electric service to customers.			
Scheduling of pumping energy and coordination between the providers of the pumping energy and the project and accounting of all transactions relative to pumping operations of the Carters Project. Perform control area services for the three Savannah River Projects-Hartwell, Russell and Thurmond. Coordinate power operations of 23 projects with all parties making determinations of capacity and energy availability weekly, and monitor testing of pump-back units at the Richard B. Russell Project until the units are declared commercially operable. Beginning in FY2000 customers will arrange for their own purchase power and transmission requirements.			
Power billing, collection, and payment functions for approximately 300 contracts which benefits more than 500 preference customers. Execution of budget, accounting and financial management activities for the office.			
Perform continuing engineering studies and review of actual project operations. Evaluate any impacts of proposed or actual changes to project operations. Prepare repayment analyses of each system to determine rates and issue a formal rate presentation as needed.			
Salaries and benefits are determined based on the amount of money needed to pay employees based on the GS pay schedule.	2,669	2,693	2,863
Travel			
Contract negotiations, preference customer meetings (SeFPC, Team Cumberland, Alliance), rates (forums, hearings, meetings), Congressional hearings, site visits of existing and new projects,			

	FY 1998	FY 1999	FY 2000
competitive resource strategy meetings, operations meetings with industry self-regulating groups (SERC, VACAR, FRCC & NERC), hydropower task force meetings, C2SWG (COE, Customer, & SEPA Working Group), NEPA activities, training, Power Marketing Policy Forums, National & State Customer meetings (NRECA & APPA), SeFPC O&M Subcommittee meetings, Interagency Task Force on Finance, Technical Advisory Group meetings, FERC pre-filings and hearings, carrying out headquarters responsibilities, and transportation of things.	200	195	220
Support Services			
Continue Southeastern's Competitive Resource Strategies Program to provide energy efficiency and competitiveness training for its preference customers.	175	75	125
Consulting Services for Information Management support for new accounting system	83	0	0
Other Related Expenses			
Provide administrative support for the office, rent, communications, maintenance, contract services (janitor services, library services, support for DOE Power Marketing Liaison Office, Information Management (IM), audit of financial statements, supplies and materials, equipment. Also provides for installation of various electronic equipment and data and communication lines for interconnection and interface between the projects SCADA system and Southeastern.			
FY 1998 includes reprogramming of $150,000 for accounting that is standardized with other Power Marketing Agencies and "year 2000" compliant.	1,336	1,407	1,519
Total, Program Direction	4,205	4,295	4,727

Explanation of Funding Changes FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Increases in salaries and benefits are due to promotions, pay increases and within grade increases and one additional FTE to work in Information Management (IM).	+170,000
Travel	
■ Increases in travel expenses are due to general increases associated with transportation, per diem rates, and higher volume of travel for supplemental operations training and licensing. Southeastern's remote location requires extensive travel.	+25,000
Support Services	
■ Support services partially restores funding for competitiveness and energy efficiency workshops to help customers address issues surrounding the implementation of energy efficiency programs in a competitive market. Cost sharing of this program with customers allows the FY 2000 budget be slightly less than the FY 1998 level.	+50,000
Other Related Expenses	
■ Other Related Expenses. IM support and installation of equipment and communications lines for interconnection and interface between the projects SCADA systems and Southeastern. Increase due to general inflation in the cost of related services, supplies, materials and other communication equipment.	+112,000
Total Funding Change, Program Direction	+357,000

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	FY 2000/FY 1999 Change
Competitive Resource Strategies	175	75	125	+50
Information Management support and accounting system support	83	0	0	0
Total Support Services	258	75	125	+50
Use of Prior Year Balances	0	0	0	0
Total Support Services	258	75	125	+50

Other Related Expenses

(dollars in thousands)

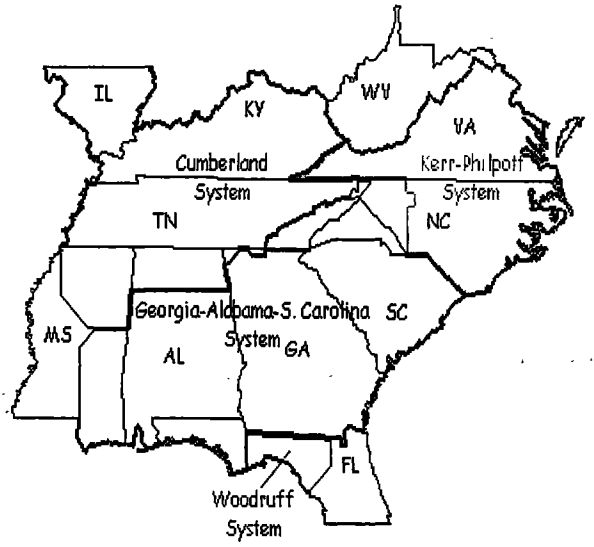
	FY 1998	FY 1999	FY 2000	FY 1999/FY 2000 Change
Audit of Financial Statements	95	96	99	+3
Communications	236	237	256	+19
Rental Space	111	150	200	+50
Maintenance Agreements	84	99	120	+21
Tuition	50	75	80	+5
Printing & Reproduction	11	11	12	+1
Supplies & Materials	168	170	196	+26
Contract Services	285	284	307	+23
Equipment, (General and IM)	296	235	99	-136
IM, electronic equipment, and data communication lines for control center interconnection and interfaces between projects SCADA systems and Southeastern			100	+100
Total Obligation Authority	1,336	1,357	1,469	+112
Use of Prior Year Balances	0	0	0	0
Total Budget Authority	1,336	1,357	1,469	+112

DEPARTMENT OF ENERGY

FY 2000 CONGRESSIONAL BUDGET REQUEST

MARKETING AREA MAP

SOUTHEASTERN POWER ADMINISTRATION



DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST

SOUTHEASTERN POWER ADMINISTRATION
ALTERNATIVE FINANCING

(dollars in thousands)

FY 1998	Transmission	Purchase Power	Reimbursements	Net Bill	Appropriated Funds
Jim Woodruff System	0	800	0	-200	600
Kerr-Philpott System	4,159	0	0	0	4,159
GA-AL-SC System	21,203	9,540	-20,000	-4,553	6,190
Cumberland System	7,200	0	0	-7,000	200
Total:	32,562	10,340	-20,000	-11,753	11,149
FY 1999					
Jim Woodruff System	0	800	0	-200	600
Kerr-Philpott System	4,356	0	0	0	4,356
GA-AL-SC System	21,078	12,521	-28,000	-4,631	968
Cumberland System	7,206	0	0	-7,000	206
Total:	32,640	13,321	-28,000	-11,831	6,130
FY 2000					
Jim Woodruff System	0	0	0	0	0
Kerr-Philpott System	0	0	0	0	0
GA-AL-SC System	0	0	0	0	0
Cumberland System	0	0	0	0	0
Total:	0	0	0	0	0

DEPARTMENT OF ENERGY

FY 2000 CONGRESSIONAL BUDGET REQUEST

SOUTHEASTERN POWER ADMINISTRATION

REVENUES AND RECEIPTS

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Southeastern Power Administration							
Gross Revenues:							
Sale & transmission of electric energy	152,192	143,665	129,457	169,385	169,774	169,774	169,774
Revenue from Reimbursements[a] ...	16,802	28,000	0	0	0	0	0
Subtotal	168,994	171,665	129,457	169,385	169,774	169,774	169,774
Less:							
Reimbursements ...	-16,802	-28,000	0	0	0	0	0
Net billing amount credited as an offsetting receipt	-10,840	-10,575	0	0	0	0	0
Total Proprietary Receipts[bc]	**141,108**	**133,090**	**129,457**	**169,385**	**169,774**	**169,774**	**169,774**
Percent of sales to preference customers [d]	99%	99%	99%	99%	99%	99%	99%
Energy sales and Power Marketed (in billions of kilowatt hours)	8	8	8	8	8	8	8

[a]Although $8 million for Russell pumping was added to revenues, the project is not expected to be declared commercially operable during FY 1999.

[b]Receipts in FY1998 and out years have been increased $3 million to reflect the recovery of the unfunded portion of the Civil Service Retirement System and Post Retirement Benefits for Southeastern and the U.S. Army Corps of Engineers power related employees.

[c]Revenue increase in FY 2001 anticipated when the Richard B. Russell Project pump-back units are declared commercially operable. Revenue increase in FY 2000 due to rate increase.

[d]Includes TVA.

DEPARTMENT OF ENERGY

FY 2000 CONGRESSIONAL BUDGET REQUEST

SYSTEM STATISTICS

SOUTHEASTERN POWER ADMINISTRATION

	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate
Generating Capacity:			
Installed Capacity (KW)	3,092,675 [a]	3,092,675 [a]	3,092,675 [a]
Peak Capacity (KW)	3,690,000 [b]	3,690,000	3,690,000
Generating Stations:			
Generating Projects (No.)	23	23	23
Available energy:			
Energy from Streamflow	9,065,493	7,700,000	7,700,000
Energy from Pumping	124,289	630,000	630,000
Energy Purchased (MWH)	39,088 [c]	75,000 [c]	0 [c]
Energy Available for Marketing (MWH)	9,228,870 [d]	8,405,000 [d]	8,330,000 [d]

[a] If four pump-generators at the Richard B. Russell Project go into commercial operation in late FY 2000, the installed capacity would be increased by 300,000 kw.

[b] Contracted capacity included reserves and losses.

[c] Jim Woodruff firming (36,968 mwh) and GA-AL-SC deficiency power (2,120 mwh).

[d] Gross amount; transmission losses of approximately 250 mwh must be deducted from this quantity to get net energy marketed to customers.

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

SOUTHEASTERN POWER ADMINISTRATION

Project	State	Plants	Installed Capacity (KW)	Estimated Power (GWH) FY 1998	FY 1999	FY 2000
John H. Kerr [a]	VA-NC	1	204,000			
Philpott [a]	VA	1	14,000	622	475	475
Allatoona [b]	GA	1	74,000			
Buford [b]	GA	1	86,000			
Carters [b]	GA	1	500,000			
J. Strom Thurmond [b]	GA-SC	1	280,000			
Walter F. George [b]	GA-AL	1	130,000			
Hartwell [b]	GA-SC	1	344,000			
R. F. Henry [b]	AL	1	68,000			
Millers Ferry [b]	AL	1	75,000			
West Point [b]	GA-AL	1	73,375			
Richard B. Russell [b]	GA-SC	1	300,000	4,531	4,096	4,096
Jim Woodruff	FL-GA	1	30,000	201	230	230
Barkley [c]	KY	1	130,000			
Center Hill [c]	TN	1	135,000			
Cheatham [c]	TN	1	36,000			
Cordell Hull [c]	TN	1	100,000			
Dale Hollow [c]	TN	1	54,000			
Old Hickory [c]	TN	1	100,000			
J. Percy Priest [c]	TN	1	28,000			
Wolf Creek [c]	TN	1	270,000			
Laurel [c]	TN	1	61,000	3,255	3,260	3,260
Stonewall Jackson	WV	1	300	1	1	1
Total Power Marketed:		23	3,092,675	8,610	8,062	8,062

[a,b,c] Projects are integrated hydraulically, electrically, and financially for marketing purposes.

DEPARTMENT OF ENERGY

FY 2000 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION

SOUTHEASTERN POWER ADMINISTRATION

In *Central Electric Power Cooperative, Inc., et al. vs. Southeastern Power Administration, et al.*, No. 3-91-2449-0 (D.C.S.C.; filed August 15, 1991), six customers in South Carolina filed suit against Southeastern in U.S. District Court requesting the court to declare illegal Southeastern's energy surcharge contained in its 1990 approved rates for the Georgia-Alabama-South Carolina System, as applied to these customers. These six customers (five cooperatives and South Carolina Public Service Authority) had declined to participate in a voluntary short-term rate increase during 1989, while 168 other customers in the system participated in the voluntary rate increase earlier than allowed by their contracts. The short-term rate change was required to offset the effects of extensive droughts in the southeast and escalating Corps of Engineers operation and maintenance costs. The energy surcharge contained in those rates was to collect the portion of the costs not recovered from these six customers, and the costs were fully collected by September 1993. The parties have filed Motions for Summary Judgment which were argued in October 1992, and a ruling by the District Court is expected at any time.

DEPARTMENT OF ENERGY

FY 2000 CONGRESSIONAL BUDGET REQUEST

CROSSCUTS

SOUTHEASTERN POWER ADMINISTRATION

Environment, Safety and Health

Southeastern is located in a field office and is not involved in any environmentally hazardous activities.

Safeguards and Security

In terms of national security Southeastern does not handle any politically or militarily sensitive information.

Information Management

Southeastern carries out all of its data processing and typing via use of easily attainable hardware and software. In some cases the communications software is customized for power delivery and tracking. Information management is not a proportionally large part of Southeastern's total budget.

EE and ER Solar and Renewables

We participate as appropriate through the Competitive Resource Strategies Program.

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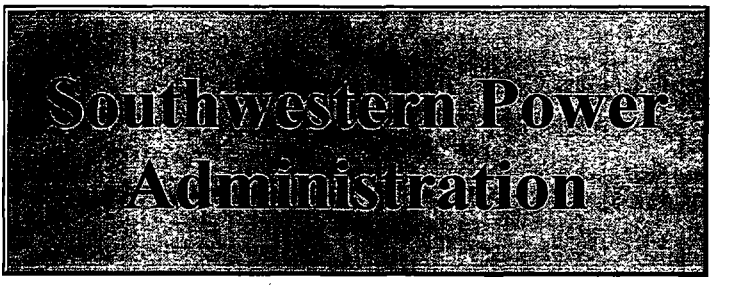
Southwestern Power
Administration

Operation and Maintenance
Southwestern Power Administration

Proposed Appropriation Language

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations and appurtenant facilities, and for administrative expenses, including official reception and representation expenses in an amount not to exceed $1,500 connected therewith, in carrying out the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, [$26,000,000] *$27,940,000*, to remain available until expended, *of which $773,000 shall be derived by transfer from unobligated balances in "Operation and Maintenance, Southeastern Power Administration";* in addition, notwithstanding the provisions of 31 U.S.C. 3302, not to exceed $4,200,000 in reimbursements, to remain available until expended.

Explanation of Change

Change in appropriation language reflects a budget authority derived, in part, from an appropriation transfer.

Operation and Maintenance
Southwestern Power Administration

Executive Budget Summary

Mission

Southwestern Power Administration's (Southwestern) mission fulfills requirements of section 5 of the Flood Control Act of 1944 by marketing and reliably delivering Federal hydroelectric power, with preference given to public bodies and cooperatives. This will be accomplished by maximizing the use of Federal assets to repay the Federal investment while balancing power needs with the diverse interests of other water resource users and implementing public policy. As part of the Department of Energy's (DOE) Strategic Plan in the Energy Resources and Corporate Management business lines, Southwestern's program promotes secure, competitive, and environmentally responsible energy systems by reducing the vulnerability of the U.S. economy to disruptions in energy supplies.

Southwestern's goals and objectives are to market and deliver power in a safe and reliable manner while providing environmental and economic benefits to the region, encouraging competition, and repaying the Federal investment plus interest.

To integrate the operation of the Federal hydroelectric generating plants and to transmit power from U.S. Army Corps of Engineers (Corps) dams to its customers, Southwestern maintains 1,380 miles of high-voltage transmission line, 24 substations, and 46 microwave and VHF radio sites. Southwestern's headquarters is in Tulsa, Oklahoma; its dispatch center is in Springfield, Missouri; and its maintenance crews are based in Jonesboro, Arkansas; Gore and Tupelo, Oklahoma; and Springfield, Missouri.

Strategy

In order to achieve safety and reliability while staying competitive, Southwestern will accomplish its mission with 177 Federal employees, 42 Contractor employees, budget authority of $27,940,000 of which ($773,000 will be derived from an appropriation transfer), reimbursable authority of $4,200,000 and through three program activities: Operations and Maintenance, Construction, and Program Direction. In addition, Southwestern will perform reimbursable work activities, for Federal entities under the Economy Act of 1932 and non-Federal entities under authority provided in the annual appropriation language. All carryover balances have been reviewed as potential funding sources and have been determined to be unavailable to offset new budget authority.

FY 1998 Accomplishments (Results)

- Marketed 100 percent of firm capacity and associated energy to public bodies and cooperatives according to Southwestern's marketing plan.
- Produced $429.6 million in economic benefits based on water conditions in FY 1998 and at FY 1997 average power values.

- Saved 10.2 million barrels of oil, 2.9 million tons of coal, or 63 billion cubic feet of gas under FY 1998 water conditions through hydropower generation.
- Achieved a System Average Interruption Duration Index (SAIDI) in which 100 percent of the points of delivery had fewer than 150 minutes of total preventable outages.
- Achieved a power system control area compliance rating of "pass" using the North American Electric Reliability Council (NERC) performance standard.
- Achieved a .6 lost time injury frequency rate compared to a 2.7 industry average rate.
- Developed and implemented an open access transmission tariff.
- Power repayment studies were completed on three power systems and rates are sufficient for repayment to remain on schedule.
- FY 1998 audited financial data is pending which will determine the ratio between cumulative principal payments and the total Federal investment.
- FY 1998 audited financial data is pending which will determine the results of the debt service coverage ratio.

FY 1999 Accomplishments (Planned)

- Market 100 percent of firm capacity and associated energy offering it first to public bodies and cooperatives according to Southwestern's marketing plan.
- Produce $425.9 million in economic benefits under average water conditions and at FY 1998 average power values.
- Save 9.2 million barrels of oil, 2.7 million tons of coal, or 56 billion cubic feet of gas under average water conditions through hydropower generation.
- Achieve a SAIDI of not more than 150 minutes of total preventable outages per year per delivery point.
- Achieve a power system control area compliance rating of "pass" NERC performance standard.
- Maintain a safety record of a lost time injury frequency rate at or lower than the industry average.
- Continue to implement Southwestern's open access tariff and work with the regional electric reliability council to encourage competition through cooperation with the security coordinator and development of regional transmission tariffs.
- Perform annual Power Repayment Studies to assure that the cumulative status of repayment remains on schedule by filing new rates, if necessary.
- Increase cumulative principal payment to total repayable Federal investment ratio by two percent based on average water conditions.
- Achieve a debt service coverage ratio of 1.0 based on average water conditions.

FY 2000 Accomplishments (Planned)

- Market 100 percent of firm capacity and associated energy offering it first to public bodies and cooperatives according to Southwestern's marketing plan.
- Produce $431.0 million in economic benefits under average water conditions and at FY 1999 average power values.
- Save 9.2 million barrels of oil, 2.7 million tons of coal, 56 billion cubic feet of gas under average water conditions through hydropower generation.
- Achieve a SAIDI of not more than 150 minutes of total preventable outages per year per delivery point.
- Ensure that the power system control area operated by Southwestern receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Electric Reliability Council performance standard.
- Achieve a safety performance of at most a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked or the Bureau of Labor statistics industry rate, whichever is lower.
- Continue to implement Southwestern's open access tariff and work with the regional electric reliability council to encourage competition through cooperation with the security coordinator and development of regional transmission tariffs and integrated system operation.
- Perform annual Power Repayment Studies to assure that the cumulative status of repayment remains on schedule by filing new rates, if necessary.
- Meet planned repayment of principal on power investment.
- Achieve a debt service coverage ratio of 1.0 based on average water conditions.

Major Changes

- Beginning in FY 2000, Southwestern will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of Southwestern will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that result from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by Southwestern.
- Southwestern's Open Access Transmission Tariff was approved on May 13, 1998. The Federal Energy Regulatory Commission (FERC) granted Southwestern's petition for Declaratory Order, finding that the tariff meets FERC's comparability standards.
- Starting June 1, 1998, Southwestern began operating under the Southwest Power Pool regional tariff for short term transmission transactions.
- Southwestern's Integrated System and Robert D. Willis rate increases were implemented on January 1, 1998, pursuant to interim approval by the Deputy Secretary of Energy. Southwestern implemented a rate increase of 1.9 percent for the Integrated System which also included a redesign

of transmission service rates to comply with the intent of FERC Order No. 888. FERC issued final approval of these rates on April 29, 1998. A rate increase of 13.5 percent for the Robert D. Willis project was approved on a final basis on April 28, 1998. The rate for the Sam Rayburn project was extended on an interim basis for a one-year period by the Deputy Secretary of Energy.

- On September 18, 1998, the FERC approved Southwestern's Open Access Transmission Standards of Conduct subject to minor revisions and granted Southwestern a waiver of the separation of functions portion of the Standards of Conduct requirements.
- A reorganization of the Maintenance activity occurred in April 1998 to effect better utilization of personnel resources by creating a team to address engineering concerns such as changes in transmission line loads resulting from system open access; and by reassigning communication maintenance to coordinate communication issues between the maintenance of the system and the Power System Dispatch Center.
- Consistent with Southwestern's Organization 2000 Plus Initiative, Corporate Services, specifically Environment, Safety and Health and Administrative Services, reorganized in early FY 1998 to flatten the organization and reduce supervisor to employee ratios.
- Beginning in FY 2000, the Operations and Maintenance (O&M) program activity will reflect $415,000 of routine transmission system replacements (circuit breakers and potential transformers) that have been included in the Construction program activity in previous years. The inclusion of these routine replacements in O&M more accurately fits the O&M program description.
- Southwestern's FY 2000 Program Direction activity has increased in part due to FY 1998 regional job surveys and negotiated union payroll increases for dispatchers (7.5 percent) and power system maintenance personnel (5.9 percent), reflecting a competitive market for these skills in a deregulated industry.
- Southwestern's Strategic Plan was revised in FY 1998 to further align to the Department's Strategic Plan and to enable Southwestern to evaluate program performance against organizational goals and objectives.
- Southwestern has two critical systems that are required to be Year 2000 ready. The existing Supervisory Control and Data Acquisition/Energy Management System was Year 2000 ready when installed in FY 1996. The current Integrated Accounting System is being replaced with a Year 2000 ready Joint Financial Improvement Program certified system. The new system will be operational by March 31, 1999.

Major Issues

- The demand for energy with the resulting loads on the Federal power facilities and the age of these facilities are forcing increased maintenance and replacement of equipment.

Site Funding and Federal and Contractor Staffing Profile

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Operations and Maintenance	2,382	2,722	3,625[a]
Purchased Power and Wheeling	57	59	0
Construction	6,752	6,817	6,684
Program Direction	17,919[b]	16,402	17,631
Total Program	27,110	26,000	27,940
Adjustment	-1,290	0	0
Budget Authority	25,820	26,000	27,940
Federal Full-Time Equivalents	174	175	177
Contractors	45	45	42

Program Performance Measures

- Based on the annual performance measurements review in FY 1998, Southwestern developed performance goals and objectives supported by performance measurements that crosscut programs.
  - Market and deliver all available hydroelectric power as measured by the amount of firm capacity and associated energy delivered, economic benefits realized, and fossil fuels saved.
  - Operate and maintain the transmission system as measured by the NERC standard, the SAIDI, a recordable accident frequency rate, and Southwestern's work with the regional electric reliability council.
  - Repayment of the Federal investment as measured by the cumulative status of repayment, the planned repayment of principal on the power investment, and a 1.0 debt service coverage ratio.

Michael A. Deihl, Administrator
Southwestern Power Administration

January 22, 1999
Date

[a]Reflects an appropriation transfer of $773,000.

[b]Reflects an appropriation transfer of $610,000.

Southwestern Power Administration

Program Mission

Southwestern Power Administration's (Southwestern) mission fulfills requirements of section 5 of the Flood Control Act of 1944 by marketing and reliably delivering Federal hydroelectric power, with preference given to public bodies and cooperatives. This will be accomplished by maximizing the use of Federal assets to repay the Federal investment while balancing power needs with the diverse interests of other water resource users and implementing public policy. As part of the Department of Energy's (DOE) Strategic Plan in the Energy Resources and Corporate Management business lines, Southwestern's program promotes secure, competitive, and environmentally responsible energy systems by reducing the vulnerability of the U.S. economy to disruptions in energy supplies.

To integrate the operation of the Federal hydroelectric generating plants and to transmit power from U.S. Army Corps of Engineers (Corps) dams to its customers, Southwestern maintains 1,380 miles of high-voltage transmission line, 24 substations, and 46 microwave and VHF radio sites. Southwestern's headquarters is in Tulsa, Oklahoma; its dispatch center is in Springfield, Missouri; and its maintenance crews are based in Jonesboro, Arkansas, Gore and Tupelo, Oklahoma; and Springfield, Missouri.

In order to achieve safety and reliability while staying competitive, Southwestern will accomplish its mission with 177 Federal employees, 42 Contractor employees, budget authority of $27,940,000 (of which $773,000 will be derived from an appropriation transfer), reimbursable authority of $4,200,000 and through three program activities: Operations and Maintenance, Construction, and Program Direction. In addition, Southwestern will perform reimbursable work activities, for Federal entities under the Economy Act of 1932 and non-Federal entities under authority provided in the annual appropriation language.

Program Goals

- Market and deliver all available hydroelectric power from Corps dams while balancing power needs with the diverse interests of other water resource users.
- Operate and maintain a Federal transmission system to assure reliability of the interconnected system while meeting utility safety standards and encouraging competition through open access to facilities.
- Maximize the use of Federal assets to repay the investment, including principal and interest, and operation and maintenance costs of the Federal power program.

Program Objectives

- Assure all power and energy is marketed, offering it first to public bodies and cooperatives.
- Provide widespread economic benefits while assuring repayment of the Government's costs.
- Provide environmental benefits by reducing the use of non-renewable resources.
- Provide reliable deliveries of electric power to customers.

- Operate the transmission system to assure efficient matching of generation to load.
- Operate and maintain the transmission system safely.
- Continue to provide open access to transmission facilities to encourage competition.
- Assure that the Government's hydropower costs are repaid according to sound business principles.

Performance Measures

Southwestern's FY 2000 performance measurements support the DOE's Strategic Plan and assume that requirements of the authorizing program legislation, Section 5 of the Flood Control Act of 1944, is fulfilled. Performance measurements are to:

- Market 100 percent of firm capacity and associated energy offering it first to public bodies and cooperatives according to Southwestern's marketing plan.
- Produce $431.0 million in economic benefits under average water conditions and at FY 1999 power values.
- Save 9.2 million barrels of oil, 2.7 million tons of coal, or 56 billion cubic feet of gas under average water conditions through hydropower generation.
- Achieve a System Average Interruption Duration Index (SAIDI) of not more than 150 minutes of total preventable outages per year per delivery point.
- Ensure that the power system control area operated by Southwestern receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Electric Reliability Council performance standard.
- Achieve a safety performance of at most a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked or the Bureau of Labor statistics industry rate, whichever is lower.
- Continue to implement Southwestern's open access tariff and work with the regional electric reliability council to encourage competition through cooperation with the security coordinator in the development of regional transmission tariffs and integrated system operation.
- Perform annual Power Repayment Studies to assure that the cumulative status of repayment remains on schedule by filing new rates, if necessary.
- Meet planned repayment of principal on power investment.
- Achieve a debt service coverage ratio of 1.0 based on average water conditions.

Significant Accomplishments and Program Shifts

Purchased Power and Wheeling

- Beginning in FY 2000, Southwestern will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of Southwestern will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that result from

restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by Southwestern.

Operations and Maintenance

- Beginning in FY 2000, the Operations and Maintenance (O&M) program activity will reflect $415,000 of routine transmission system replacements (circuit breakers and potential transformers) that have been included in the Construction program activity in previous years. The inclusion of these routine replacements in O&M more accurately fits the O&M program description.

Program Direction

- A reorganization of the Maintenance activity occurred in April 1998 to effect better utilization of personnel resources by creating a team to address engineering concerns such as changes in transmission line loads resulting from system open access; and by reassigning communication maintenance to more effectively coordinate communication issues between the maintenance of the system and the Power System Dispatch Center.
- Consistent with Southwestern's Organization 2000 Plus Initiative, Corporate Services, specifically Environment, Safety and Health and Administrative Services, reorganized in early FY 1998 to further flatten the organization and reduce supervisor to employee ratios.
- Southwestern's FY 2000 Program Direction activity has increased in part due to FY 1998 regional job surveys and negotiated union payroll increases for dispatchers (7.5 percent) and power system maintenance personnel (5.9 percent), reflecting a competitive market for these skills in a deregulated industry.

Agency Wide

Because Southwestern's program activities are interrelated, the following accomplishments crosscut programs:

- In FY 1998, Southwestern marketed 6.1 gigawatthours and transmission services with a gross revenue production of $94,901,000. As of September 30, 1998, cumulative repayable Federal investment is estimated to be $1,086,000,000. Contingent on final FY1998 audited financial statements, an estimated $440,000,000 will have been repaid with approximately $624,100,000 in interest.
- Southwestern operated and maintained 1,380 circuit miles of high-voltage transmission line, 24 substations, and 46 microwave and VHF radio sites, located across three states, thereby marketing and providing reliable hydroelectric power to 93 customers and approximately 7 million end users from 24 separate power projects.
- Southwestern's Open Access Transmission Tariff was approved on May 13, 1998. The Federal Energy Regulatory Commission (FERC) granted Southwestern's petition for Declaratory Order, finding that the tariff meets FERC's comparability standards.
- Starting June 1, 1998, Southwestern began operating under the Southwest Power Pool regional tariff for transmission transactions.

- Southwestern's Integrated System and Robert D. Willis rate increases were implemented on January 1, 1998, pursuant to interim approval by the Deputy Secretary of Energy. Southwestern implemented a rate increase of 1.9 percent for the Integrated System which also included a redesign of transmission service rates to comply with the intent of FERC Order No. 888. FERC issued final approval of these rates on April 29, 1998. A rate increase of 13.5 percent for the Robert D. Willis project was approved on a final basis on April 28, 1998. The rate for the Sam Rayburn project was extended on an interim basis for a one-year period by the Deputy Secretary of Energy.
- On September 18, 1998, the FERC approved Southwestern's Open Access Transmission Standards of Conduct subject to minor revisions and granted Southwestern a waiver of the separation of functions portion of the Standards of Conduct requirements.
- In FY 1998, Southwestern received the Department of Energy's Small Business Program Award. This award reflects Southwestern's continuing commitment to reserve a portion of the acquisition program for small and disadvantaged businesses.
- Southwestern will make use of reimbursable authority, bill crediting, and net billing capabilities to maintain and recover the investment in the Federal power facilities, and to assure reliable electrical service to the region.
- Southwestern's Strategic Plan was revised in FY 1998 to further align with the Department of Energy's Strategic Plan and to enable Southwestern to evaluate program performance against organizational goals and objectives.
- Southwestern has two critical systems that are required to be Year 2000 ready. The existing Supervisory Control and Data Acquisition/Energy Management System was Year 2000 ready when installed in FY1996. The current Integrated Accounting System is being replaced with a Year 2000 ready Joint Financial Improvement Program certified system. The new system will be operational by March 31, 1999.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Southwestern Power Administration					
Operations and Maintenance	2,382	2,722	0	2,722	3,625[a]
Purchased Power and Wheeling	57	59	0	59	0
Construction	6,752	6,817	0	6,817	6,684
Program Direction	17,919[b]	16,402	0	16,402	17,631
Subtotal,Southwestern Power Administration	27,110	26,000	0	26,000	27,940
Use of Prior Year Balances	-1,290	0	0	0	0
Total,Southwestern Power Administration	25,820	26,000	0	26,000	27,940

Public Law Authorizations:
Public Law 78-534, "Flood Control Act of 1944"
Public Law 95-91, :DOE Organization Act of 1977", Section 302
Public Law 102-486, "Energy Policy Act of 1992"

[a]Reflects an appropriation transfer of $773,000.

[b]Reflects an appropriation transfer of $610,000.

Funding By Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Southwestern Power Administration	27,110	26,000	27,940	1,940	+7.5%
Subtotal,Southwestern Power Administration	27,110[a]	26,000	27,940[b]	1,940	+7.5%
Use of Prior Year Balances	-1,290	0	0	0	
Total,Southwestern Power Administration	25,820	26,000	27,940	1,940	+7.5%

[a]Reflects a funds transfer of $610,000.

[b]Reflects a funds transfer of $773,000.

Site Description

An agency of the Department of Energy, Southwestern Power Administration (Southwestern) was created in 1943 to market power and energy produced at U.S. Army Corps of Engineers hydroelectric power projects. Southwestern markets power at wholesale rates to 78 municipal utilities, 12 rural electric cooperatives, and three government agencies in the six states of Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas. To integrate the operation of the Federal hydroelectric generating plants and to transmit power from 24 U.S. Army Corps of Engineers dams to customers, Southwestern operates and maintains1,380 miles of high-voltage transmission line, 24 substations, and 46 microwave and VHF radio sites. Southwestern operates from five locations. The Headquarters is located in Tulsa, Oklahoma; the dispatch center in Springfield, Missouri; and the maintenance crews are located in Jonesboro, Arkansas; Gore and Tupelo, Oklahoma; and Springfield, Missouri.

Operations and Maintenance

Mission Supporting Goals and Objectives

Southwestern's Operations and Maintenance (O&M) activity fulfills the requirements of Section 5 of the Flood Control Act of 1944 and reflects Southwestern's goals and objectives to market and deliver power in a safe and reliable manner while providing environmental and economic benefits to the region, encouraging competition and repaying the Federal investment plus interest. The O&M program also supports the Department of Energy's Strategic Plan to promote secure, competitive, and environmentally responsible energy systems by reducing the vulnerability of the U.S. economy to disruptions in energy supplies.

Southwestern markets power in a six-state area from 24 multi-purpose Federal dams operated by the U.S. Army Corps of Engineers. To integrate the operation of the Federal hydroelectric generating plants and to transmit power from the U.S. Army Corps of Engineers dams to customers, Southwestern maintains 1,380 miles of high-voltage transmission line, 24 substations, and 46 microwave and VHF radio sites.

Southwestern's facilities were built 35-50 years ago and are constantly evaluated to develop a systematic maintenance program through the Maintenance Management Information System (MMIS). Data from the MMIS (age, risk of failure, life cycle of equipment), field crew evaluation, obsolescence of technology, lack of replacement parts are all variables that are assessed when determining the level of funding required for a fiscal year.

Estimates provided in this activity represent power marketing, operations, and maintenance activities. Power Marketing provides for technical and economic studies to support Southwestern's transmission planning, water resources, communications, environment, safety and health, and maintenance activities. Technical and economic studies provide data to analyze and evaluate the impacts of proposed operational changes and for decision making based on cost/benefit analysis.

The Operations activity provides for the day-to-day communications support of the Supervisory Control and Data Acquisition/Energy Management System (SCADA/EMS), and other associated communication activities. Communications also support fiber optic and microwave radio construction projects. In addition, the Operations activity develops and implements operational arrangements with competing users. In conjunction with this activity, Southwestern works with customers through alternative finance arrangements and other Federal entities in studying and implementing dissolved oxygen monitoring programs to optimize Federal hydropower production and fulfill Southwestern's contractual obligations.

The Maintenance activity provides for the day-to-day routine replacements on the transmission facilities. Activities are divided into substation and line maintenance and includes communication tower maintenance, protection of facilities, hazardous waste removal, right-of-way clearing, air patrol of lines, diagnostic testing, and general building maintenance.

Performance Measures

Southwestern's performance measures crosscut programs and support the following goals:

- Market and deliver all available hydroelectric power as measured by the amount of firm capacity and associated energy delivered, economic benefits realized, and fossil fuels saved.
- Operate and maintain the transmission system as measured by the NERC standard, the SAIDI, a recordable accident frequency rate, and Southwestern's work with the regional electric reliability council.
- Repayment of the Federal investment as measured by the cumulative status of repayment, the planned repayment of principal on the power investment, and a 1.0 debt service coverage ratio.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Operations and Maintenance	2,382	2,722	3,625	+903	+33.2%
Total, Operations and Maintenance	2,382	2,722	3,625	+903	+33.2%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Operations and Maintenance			
■ Power marketing provides technical and economic studies for transmission planning activities such as protective relaying, environment, safety and health, water resources, communication, and maintenance.	162	174	693
▸ In FY 2000, annually recurring mandatory transmission planning studies will be performed:			
– One dynamic stability evaluation;			
– Two Southwestern Federal Power System short circuit investigations. Business essential transmission planning studies will be performed;			
– 48 Southwest Power Pool model updates;			
– 25 power system protective relay coordination studies;			
– 4 Available Transmission Capacity updates (one per season);			
– 5 customer interconnection/facility addition analyses arising from open transmission access and market pressures on Southwestern customers and connected utilities.			
The number of business essential studies are increasing at a rate of 20 percent per year based on historical records.			
▸ The funding level is appropriate for the average number of studies required per year that would have operational impacts on how Southwestern markets and delivers power. Estimate is derived from the negotiated architect/engineering contract.			
▸ Approximately $354,000 of planning studies were reassigned from maintenance to the power marketing activity.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Environmental estimate ($165,000) includes contract services to develop an environmental plan that addresses the use and preservation of historic, archeological and cultural resources. The plan would assess the physical environment where Southwestern's transmitting facilities are located, summarize the prehistoric, ethnohistoric and historic use of the location area, and define the management and methodology of the program. Funding this program is necessary to comply with 16 USC 431-433, 16 USC 461-467, 16 USC 469, 16 USC 470; 42 USC 4321-4347, 42 USC 1996 and Executive Orders 11593, 13006 and 13007. This funding also includes a revision to the existing spill prevention, control and countermeasures plan to include reviews of Southwestern's sites. Funding this program is necessary to comply with the Natural Resources Damage Assessment requirements of the Oil Pollution Act of 1990 and 42 USC 4321, 42 USC 6901, 33 USC 1251, 40 USC 9601 and 49 USC 2601. Funding for the two plans is derived from government procurement cost estimates for similar work.			
■ Operations provides for the development and implementation of operational arrangements with competing water users and transmission communication activities.. . . .	149	0	505
▸ Development and implementation of operational arrangements with competing water users will be funded through customer financing.			
▸ In FY 2000, transmission communication costs is included in Operations. This activity had previously been reported in the Maintenance Subprogram below. The transferred communication activity includes the purchase of supplies and materials such as digital testing equipment, system modules, and work stations for SCADA support and a Geographical Information System. The Communication expense increase is related to SCADA equipment maintenance, microwave maintenance, and FERC service charges.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
▸ Estimates for SCADA and communications maintenance are derived from maintenance history, the age of the equipment, and annual diagnostic maintenance tests. The funding level is appropriate for the age (SCADA is approximately 3 years old and the microwave equipment is approximately 13 years old) and expected life span (7 years for SCADA and 15 years for microwave equipment) of the equipment.			
■ Maintenance provides for day-to-day maintenance of Southwestern's 24 substations and 1,380 miles of high-voltage transmission lines.	2,071	2,548	2,427
Substation Maintenance:			
▸ In FY 2000, work includes purchase and installation of 6 circuit breakers, 30 interchange and/or revenue meters, electrical equipment such as battery chargers, coupling capacitor voltage transformers, and potential transformers to improve system reliability; complete essential general maintenance projects; and disposal of 15 PCB contaminated electrical items.			
▸ Maintenance estimate is based on data in the Maintenance Management Information System (MMIS) which provides the age and condition of the existing equipment that predicts maintenance intervals. Estimate is calculated on age plus risk and number of units times negotiated price per unit.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Line Maintenance:			
▸ In FY 2000, purchase an estimated 50 steel structures complete with crossarms and braces; complete an estimated 400 miles of planned right-of-way (ROW) clearing, including clearing the floor of the ROW and side clearing of the ROW; 150 miles of herbicide application; and routine vehicle repair and maintenance.			
▸ The estimate for steel structures is appropriate based on data in the Overhead Transmission Maintenance System (OTMS) program. Through the use of the OTMS, the number of units (poles, crossarms, insulators) to be replaced, age of such units, and testing criteria is predetermined enabling extraction of this information at any given period of time. The estimate is calculated on existing inventory plus historical average crew production, condition of the equipment and historical pricing information for parts and materials.			
▸ In the ROW program, the growing cycle of vegetation in Southwestern's geographical area has shown that the mechanical reclearing of brush and trees in a 3-4 year cycle is needed to avoid outages. Southwestern has begun an aggressive herbicide treatment program in addition to reclearing to eliminate undesirable vegetation and extend the reclearing cycle to reduce on going costs in the outyears. Estimate is appropriate for 400 miles of vegetation control annually with 150 miles of herbicide application. Estimate is based on number of miles plus type of terrain and historical pricing information.			
Communication Maintenance:			
▸ Starting in FY 2000, communication maintenance will be performed under the Operations Activity to align the maintenance of SCADA with the operations of the transmission system which is accomplished through SCADA.			
Total, Operations and Maintenance	2,382	2,722	3,625

Explanation of Funding Changes From FY 1999 to FY 2000

Operations and Maintenance	FY 2000 vs. FY 1999 ($000)
■ Increase in power marketing is due to a consolidation of architect and engineering (A/E) studies from maintenance to power marketing ($+354,000) and an increase for environmental efforts ($+165,000) is related to Cultural Resources and Spill Control and Countermeasures.	+519
■ Increase in operations is due to the maintenance reorganization whereby the communications function moved to operations from maintenance ($+252,000). In addition, increases are reflected for SCADA upgrades ($+145,397), microwave maintenance ($+15,395), Southwestern Power Pool fees ($+40,000), Federal Energy Regulatory Commission service charge ($+26,000) and a competing use study ($+26,208).	+505
■ Decrease in maintenance reflects a shift of the communications function from maintenance to operations ($-252,000), with a shift of A/E studies to power marketing ($-354,000), and an increase to perform circuit breaker and current and potential transformers installations ($+415,000), performed in the Construction activity in previous years. In addition, increases includes environmental waste management and equipment ($+5,000), technical software and hardware maintenance ($+64,000), and repairs on an infrared camera for Energy Efficiency and Renewable Resource Program ($+1,000)	-121
Total Funding Change, Operations and Maintenance	+903

Major Issues

- The demand for energy with the resulting loads on the Federal power facilities and the age of these utilities are forcing increased maintenance and replacement of equipment.

Purchased Power and Wheeling

Mission Supporting Goals and Objectives

Beginning in FY 2000, Southwestern will no longer seek appropriations for purchase power and wheeling activities. Instead, the customers of Southwestern will make their own purchase and transmission arrangements directly with suppliers. Improved transmission access that result from restructuring of the electric industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipt estimates have been reduced to reflect the reduced spending by Southwestern.

In the past, this activity provided for purchases of energy as necessary to supplement hydroelectric and wheeling services. System Support Activities are non-discretionary energy purchases necessary to supplement hydroelectric generation to meet system contractual obligations for delivering Federal power and energy Other Contractual Activities involve the purchase of wheeling services.

Performance Measures

Southwestern's performance measures crosscut programs and support the following goals:

- Market and deliver all available hydroelectric power as measured by the amount of firm capacity and associated energy delivered, economic benefits realized, and fossil fuels saved.
- Operate and maintain the transmission system as measured by the NERC standard, the SAIDI, a recordable accident frequency rate, and Southwestern's work with the regional electric reliability council.
- Repayment of the Federal investment as measured by the cumulative status of repayment, the planned repayment of principal on the power investment, and a 1.0 debt service coverage ratio.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
System Support Activities	0	0	0	0	0.0%
Other Contractual Activities	57	59	0	-59	-100.0%
Total, Purchased Power and Wheeling	57	59	0	-59	-100.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
System Support Activities			
■ Funding request is appropriate based on Southwestern's customers funding this activity beginning in FY 2000.	0	0	0
Other Contractual Activities			
■ Funding request is based on the Southwestern's customers funding this activity beginning in FY 2000.	57	59	0
Total, Purchased Power and Wheeling	57	59	0

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
System Support Activities	
■ Southwestern's customers will fund System Support Activities in lieu of appropriations.	0
Other Contractual Activities	
■ Southwestern's customers will fund Other Contractual Activities in lieu of appropriations	-59
Total Funding Change, Purchased Power and Wheeling	-59

Construction

Mission Supporting Goals and Objectives

Southwestern's Construction activity fulfills the requirements of Section 5 of the Flood Control Act of 1944 and reflects Southwestern's goals and objectives to market and deliver power in a safe and reliable manner while providing environmental and economic benefits to the region, encouraging competition, and repaying the Federal investment plus interest. This activity also supports the Department of Energy's Strategic Plan to promote secure, competitive, and environmentally responsible energy systems by reducing the vulnerability of the U.S. economy to disruptions in energy supplies.

Southwestern's Construction activity provides for modification and replacement of transmission, substation, switching and communication facilities, and other power system equipment which enable Southwestern to market Federal hydropower in the most efficient and cost effective manner, and to meet operational criteria required as a member of the Southwest Power Pool, the regional electric reliability council. Southwestern is responsible to maintain and enhance power system safety and reliability, thereby assuring continued safe, reliable delivery of power to preference customers; to encourage new initiatives for more effective use of existing regional resources; and to participate with non-Federal interests in joint power projects of benefit to the Government. In addition to appropriated funds, Southwestern uses reimbursable authority, bill crediting, and net billing arrangements to fund Federal power system replacement projects to assure the reliability of the Federal Power System.

Substation and communication equipment replacements are planned to assure system reliability. The projects reflect Southwestern's efforts to reduce the risk of more frequent and extended service outages, avoid more costly replacements in the future, and support the increased open access activity on the power system. System age, risk of failure, life cycle, maintenance crew observations, obsolescence of technology, unavailability of replacement parts, budget constraints, cost, and need of more capacity are all variables that are assessed when determining the requirements of the Construction activity.

Southwestern's planned Construction projects are subject to change based on unanticipated equipment failure or customer needs. The realities of maintaining a complex interconnected power system means unforeseen priority projects will surface from time to time causing a deferment of planned projects to another fiscal year. However, all projects share a commonality in that they are replacements of aging existing equipment necessary to maintain the reliability of the Federal power system.

Performance Measures

Southwestern's performance measures crosscut programs and support the following goals:

- Market and deliver all available hydroelectric power as measured by the amount of firm capacity and associated energy delivered, economic benefits realized, and fossil fuels saved.
- Operate and maintain the transmission system as measured by the NERC standard, the SAIDI, a recordable accident frequency rate, and Southwestern's work with the regional electric reliability council.
- Repayment of the Federal investment as measured by the cumulative status of repayment, the planned repayment of principal on the power investment, and a 1.0 debt service coverage ratio.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Transmission System Replacements	5,987	6,387	6,278	-109	-1.7%
Capital Equipment Not Related to Construction	765	430	406	-24	-5.6%
Total, Construction	6,752	6,817	6,684	-133	-2.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Transmission System Replacements			
■ Substation equipment replacements are planned to assure system reliability and reliable service to Southwestern's customers. The age of substation equipment to be replaced ranges from 30 - 37 years	5,987	6,387	6,278
▸ In FY 2000, replacements include six duplex switch board relay panels, disconnect switches at two sites, 161-kV Breaker Bay replacement, grounding and surge protection at one site, structure refurbishment at one site, and 30 revenue meters/telemetry replacements.			
▸ In FY 2000, purchase responsibility for circuit breakers and current and potential transformer replacements has been shifted to the Operation and Maintenance budget.			
■ Communication equipment replacements are planned to provide necessary improvements in system reliability and reduce maintenance and equipment costs. The age of communication equipment to be replaced ranges from 30 - 35 years.			
▸ In FY 2000, replacements include one microwave site, and 146 miles of optical shield wire. Funds are also included for maintenance and upgrades to SCADA previously covered under warranty in the original purchase.			
■ The funding level for transmission system replacement is appropriate based on the useful service life expended multiplied by adjustment factors that reflect whether or not the equipment's electrical rating is sufficient to safely carry the calculated available current, and a factor that dictates relative maintenance demands. Estimate is derived from competitive negotiated prices per number of units.			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Capital Equipment Not Related to Construction	765	430	406
■ Replace vehicles, tractors, trailers, and heavy equipment used for maintenance and repair of transmission system equipment and facilities. Replaced 14 vehicles in FY 1998 including special purpose vehicles, and an estimated 10 vehicles in FY 1999. In FY 2000, 5 heavy duty trucks and 4 vehicles for line crew transportation are planned.			
■ Funding level is appropriate based on GSA and DOE usage and replacement guidelines and the type of equipment needed to maintain 1,380 miles of transmission lines. Estimates are derived from GSA pricing schedules.			
Total, Construction	$6,752	$6,817	$6,684

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Transmission System Replacements	
■ Decrease in transmission system replacements is primarily attributed to the shift in responsibility for circuit breakers and current and potential transformer replacements to field maintenance funded in the Operations and Maintenance Budget ($-415,000). Increase reflects continued efforts to replace corroded static wire with fiber optic cable ($+306,000)	-109
Capital Equipment Not Related to Construction	
■ Decrease in Capital Equipment Not Related to Construction is primarily attributed to anticipated cost savings due to purchase negotiations for special purpose vehicles	-24
■ Total Funding Change, Construction	-133

Major Issues

■ The demand for energy with the resulting loads on the Federal power facilities and the age of these utilities are forcing increased maintenance and replacement of equipment.

Southwestern Power Administration Program Direction

Mission Supporting Goals and Objectives

Southwestern's Program Direction activity is based upon Southwestern's Organization 2000 Plus Initiative to reduce costs and to streamline the organization and provides salaries and benefits, travel, support services, and other support related services required to implement the requirements of Section 5 of the Flood Control Act of 1944 and reflects Southwestern's goals and objectives to market and deliver power in a safe and reliable manner while providing environmental and economic benefits to the region, encouraging competition, and repaying the Federal investment plus interest. This activity also supports the Department of Energy's Strategic Plan to promote secure, competitive, and environmentally responsible energy systems by reducing the vulnerability of the U.S. economy to disruptions in energy supplies.

Southwestern's Program Direction activity provides compensation and all related expenses for Federal personnel who operate and maintain Southwestern's high-voltage power system and associated facilities and who plan, design, and supervise the construction of replacements, upgrades, and additions (capital investments) to the power system facilities. Also included are personnel who negotiate and administer power marketing contracts, develop wholesale power rates, develop and implement operational arrangements with competing water users, schedule and deliver power to preference customers, implement environment, safety and health programs, and provide for general administration and management. These employees include, but are not limited to, civil, electrical, and electronic engineers, high-voltage linemen and electricians; power system dispatchers; public utility specialists; environmental and safety specialists; and administrative staff. Southwestern will continue to share facilities and administrative services with another DOE office. Travel associated with the operation and maintenance of the power system facilities continues at approximately the same level. Other travel needs have been reduced due to video conferencing capabilities.

The investment in support services continues to assure program support for Southwestern in the areas of word processing, records management, public affairs, computer programming, data processing, environmental, engineering, and drafting and design. Drafting and design and environmental and engineering support will continue to focus on efforts in power system replacements. Other related expenses supports Southwestern in the areas of rental space, telecommunications, utilities, printing, training, supplies, materials, non-capitalized equipment, and the working capital fund.

In FY 1998, Southwestern purchased a Year 2000 ready Joint Financial Improvement Program certified system to replace the current Integrated Accounting System. The new system is expected to be operational by March 31, 1999.

Performance Measures

Southwestern's performance measures crosscut programs and support the following goals:

- Market and deliver all available hydroelectric power as measured by the amount of firm capacity and associated energy delivered, economic benefits realized, and fossil fuels saved.
- Operate and maintain the transmission system as measured by the NERC standard, the SAIDI, a recordable accident frequency rate, and Southwestern's work with the regional electric reliability council.
- Repayment of the Federal investment as measured by the cumulative status of repayment, the planned repayment of principal on the power investment, and a 1.0 debt service coverage ratio.

Funding Schedule

(dollars in thousands, whole FTE)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Program Direction[a]					
Salaries and Benefits	11,995	11,829	13,170[b]	+1,341	+11.3%
Travel	1,010	705	620	-85	-12.1%
Support Services	1,970	1,970	1,966	-4	-0.2%
Other Related Expenses	2,944[c]	1,898	1,875	-23	-1.2%
Total, Program Direction	17,919	16,402	17,631	+1,229	+7.5%
Full-Time Equivalent (FTE)	174	175	177[d]	2	+1.1%

[a]The amounts included in Program Direction represent all salaries and benefits, all travel expenses and related personnel costs for Operations and Maintenance and Construction activities. It should be noted that this value represents not only Southwestern's administrative and/or overhead expenses, but includes direct program activity costs associated with FTE usage.

[b]Higher than estimated cost-of living increases in FY 1998 and FY 1999 resulted in fewer dollars for FTE for dispatchers and power system maintenance crews. The FTE level of 177 reflects estimates based on currently known average utility industry salaries.

[c]Reflects an appropriation transfer of $610,000.

[d]Outyear FTE levels may be higher than 177 FTE. Usage projections for the outyears will be determined based on industry restructuring requirements. This will result in a continued policy to ensure that staffing levels are adequate to maintain a safe and reliable Federal transmission system.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salaries and Benefits			
Funding in this activity is for skilled Federal employees who operate and maintain Southwestern's high-voltage interconnected power system and associated facilities, and the administrative support staff. Estimate is derived from the current year budgeted salaries and benefits plus cost-of-living adjustments plus or minus FTE change plus promotions and within grade increases. Benefits are calculated based on a percentage of prior year actuals as applied against FY 2000 budgeted salaries. This level is appropriate for 177 FTE of which 40 percent of the salaries are driven by union contract and regional pay surveys.	11,995	11,829	13,170
Travel			
Estimate includes transportation and per diem, incurred in the operation and maintenance of Southwestern's geographically dispersed power system and the performance of general administrative functions. Estimate is derived from the daily requirement of the field maintenance personnel to maintain 1,380 miles of transmission line plus a self imposed ceiling to limit all other travel and Federal travel limitations. This level is appropriate to assure reliability of the power facilities, represent the Government's interests at State, and electric municipal, and cooperative customer meetings, meet externally imposed training requirements and respond to required appearances such as the Congressional Hearings..	1,010	705	620
Support Services			
Estimate includes automated data processing, drafting, and general administrative support. Estimate is derived from the negotiated contract amount essential to Southwestern's mission. Funding level is based on the critical and essential computer based systems at Southwestern, the number of construction projects, and basic clerical and record support	1,970	1,970	1,966

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Other Related Expenses			
Estimate includes funding for rental space, telecommunications, utilities, printing and reproduction, training tuition fees, maintenance and repair of office equipment, supplies, non-capitalized equipment, working capital fund and Year 2000 compliant financial management system software Estimate is based on fixed costs plus a 2.1 percent inflation factor, age of equipment, comparative vendor estimates, and DOE assessments. This estimate is appropriate based on 43,000 square feet of leased space, communications, utilities, and repair and purchase of office equipment at Headquarters, and four field offices	2,944	1,898	1,875
Total, Program Direction	17,919	16,402	17,631

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salaries and Benefits	
■ Higher than expected cost-of-living increases occurred in FY 1998 for dispatchers (7.5 percent) and power system maintenance crews (5.9 percent). The increase for dispatchers is based on an annual regional survey for similar electric utility positions. The increase for power system maintenance crews is based on a union negotiated agreement. These increases were budgeted in FY 1998 and FY 1999 at a much lower level, causing a cumulative shortfall since FY 1998. Additionally, the salaries and benefits increase reflects cost-of-living increases (4.1 percent) and within grade increases for General Schedule employees. Promotions are reflected in all job categories. Finally, two additional FTEs are reflected.	+682
■ An increase in overtime is due to salary increases, demands to maintain an aging transmission system, and implementation of open access.	+32
■ Agency Achievement, Improvement and Measurement (AIM) awards reflect an increase because no AIM awards were budgeted in FY 1999 due to carryover from previous years.	+244
■ Workers' Compensation was inadvertently budgeted in Other Related Expenses in FY 1999 and is properly included in Salaries and Benefits with a slight increase.	+383
Total, Salaries and Benefits	+1,341

	FY 2000 vs. FY 1999 ($000)
Travel	
■ Reflects a decrease due to increased usage of video conferencing, use of the Training Center, and more stringent prioritization of travel needs	-85
Support Services	
■ Due to a reorganization of Corporate Services functions, reallocations from ADP ($-503,000), Environmental and Engineering Support ($-60,000), and Drafting and Design Support ($-36,000) were made to Clerical/Records Management ($+595,000) to accurately reflect the current organizational structure and functions.	-4
Other Related Expenses	
■ Rent (Tulsa Headquarters building lease and storage)	+60
■ Telecommunications (FTS and local phone service)	+286
■ Contract services (training requirements for procurement certification, security system maintenance, and facility services such as janitorial, repairs, office moves, painting, additional heat and air conditioning during non-core working hours.	+102
■ Printing and reproduction services	+13
■ Office equipment	+17
■ Reassignment of Workers' Compensation to Salaries and Benefits	-375
■ ADP and security supplies and materials	-70
■ Tort claims	-16
■ Contract Services (benchmarking studies, temporary help and legal investigations)	-40
Total, Other Related Expenses	-23
Total Funding Change, Program Direction	+1,229

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Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Drafting and Design Support	90	126	90	-36	-28.6%
Environmental & Engineering Support	255	260	200	-60	-23.1%
Total, Technical Support Services	345	386	290	-96	-24.9%
Management Support Services					
Clerical/Records Management	267	232	827	+595	+356.4%
ADP Support	1358	1352	849	-503	-37.2%
Total, Management Support Services	1,625	1,584	1,676	+92	+5.8%
Subtotal, Support Services	1,970	1,970	1,966	-4	-0.0%
Use of Prior Year Balances	0	0	0	0	0.0%
Total, Support Services	1,970	1,970	1,966	-4	-0.0%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	162	154	173	+19	+12.3%
Working Capital Fund	55	55	55	0	0.0%
Printing and Reproduction	137	95	108	+13	+13.7%
Rental Space	650	405	465	+60	+14.8%
Software Procurement/Maintenance Activities/Capital Acquisitions	1,529	899	839	-60	-6.7%
Other	411	290	235	-55	-19.0%
Subtotal, Other Related Expenses	2,944	1,898	1875	-23	-1.2%
Use of Prior-year Balances	0	0	0	$0	0.0%
Total, Other Related Expenses	2,944[a]	1,898	1,875	$-23	-1.2%

[a]Reflects a funds transfer of $610,000.

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST
POWER MARKETING ADMINISTRATION

REVENUES AND RECEIPTS
(Dollars in Thousands)

	FY 1998	FY 1999	[a]FY 2000	FY 2001
Southwestern Power Administration				
[b]Gross Revenues	94,901	100,503	97,470	97,218
Sale and transmission of electric energy	94,901	100,503	97,470	97,218
Net billing and bill crediting amount credited back to Appropriations as an offsetting receipt	-6,324	-5,900	-5,100	-5,100
Total Proprietary Receipts	88,577	94,603	92,370	92,118
Percent of sales to preference customers	100%	100%	100%	100%
Energy Sales from Power Marketed (billions of kilowatt hours)	6.1	5.4	5.5	5.5

	FY 2002	FY 2003	FY 2004
Southwestern Power Administration			
Gross Revenues	97,308	97,307	97,307
Sale and transmission of electric energy	97,308	97,307	97,307
Net billing amount credited back to Appropriations as an offsetting receipt	-5,100	-5,100	-5,100
Total Proprietary Receipts	92,208	92,207	92,207
Percent of sales to preference customers	100%	100%	100%
Energy Sales from Power Marketed (billions of kilowatt hours)	5.5	5.5	5.5

[a]Beginning in FY 2000 Southwestern customers will fund their own power purchases and transmission arrangements. Power receipts have been reduced to reflect the reduced spending by Southwestern.

[b]Gross Revenues for FY 1998 and the outyears include approximately $2 million to recover the unfunded portion of the Civil Service Retirement System and Post-Retirement Health Benefits for Southwestern and the U.S. Army Corps of Engineers power related employees.

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST
SYSTEMS STATISTICS

SOUTHWESTERN POWER ADMINISTRATION
(In thousands of dollars)

	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate
Generating Capacity:			
Installed Capacity (KW)	2,157,700	2,157,700	2,157,700
Peak Capacity (KW)	2,093,500	2,093,500	2,052,500
Generating Stations:			
Generating Projects (No.)	24	24	24
Substations/Switchyards (No.)	24	24	24
Substations/Switchyards (KVA Capacity)	1,026,900	1,026,900	1,026,900
Available Energy:			
Energy Generated (Megawatthours)	6,173,641	5,276,900	5,234,900
Energy Received (Megawatthours)	95,205	211,900	292,900
Energy Available for Marketing (Megawatthours)	6,268,846	5,488,800	5,527,800
Transmission Lines (Circuit Miles):			
161 KV	1,117	1,117	1,117
138 KV	164	164	164
69 KV	99	99	99
Total Circuit Miles	1,380	1,380	1,380

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED OR EXCHANGED BY STATE

SOUTHWESTERN POWER ADMINISTRATION

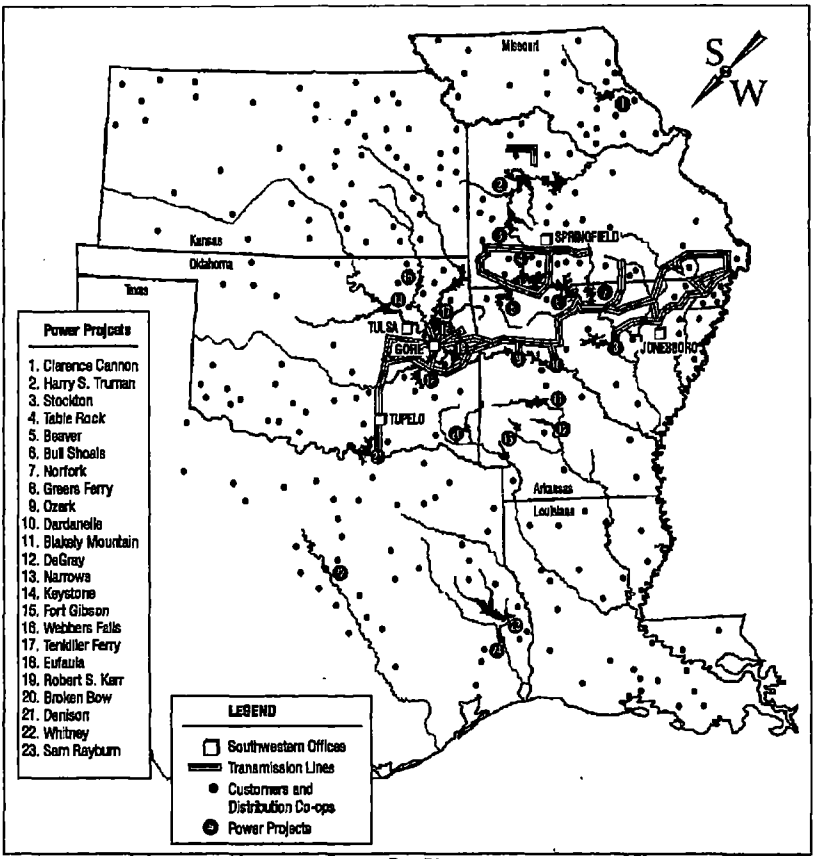
Project	State	No. Of Plants	Installed Capacity (KW)	FY 1998 Actual Energy (GWh)	FY 1999 Estimated Energy (GWh)	FY 2000 Estimated Energy (GWh)
Power Marketed:						
Interconnected System	Missouri	4	463,200	1,864	1,676	1,689
	Arkansas	9	1,021,000	1,168	1,051	1,058
	Oklahoma	7	514,100	1,261	1,134	1,142
	Texas	2	100,000	725	652	656
	Louisiana	0	0	405	364	367
	Kansas	0	0	511	460	463
Subtotals		22	2,098,300	5,934	5,337	5,376
Isolated:						
Robert D. Willis Project						
Sam Raybum Project						
50% to Texas		2	59,400	159	76	76
50% to Louisiana		0	0	39	76	76
Subtotals		2	59,400	197	152	152
Total Power Marketed		24	2,157,700	6,131	5,489	5,528
Power Wheeled/Exchanged:						
Wheeled (MW)				574	494	586
Exchanged (GWh)				163	137	185

Department of Energy

FY 2000

Congressional Budget Request

Southwestern Power Administration System Map



DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION

SOUTHWESTERN POWER ADMINISTRATION

Cajun Electric Power Cooperative, Inc., Case No. 94-2763-B2, Bankruptcy Case No. 94-11474 (filed 12/21/94), a reorganization pending in the Middle District of Louisiana which may ultimately require redistribution of Federal power to Cajun Electric Power Cooperative members.

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET SUBMISSION
ESTIMATES FOR HISTORICALLY BLACK
COLLEGES AND UNIVERSITIES
SOUTHWESTERN POWER ADMINISTRATION
(Dollars in thousands)

Appropriation/Decision Unit	Name of HBCU (if known)	FY 1998 Budget Authority	FY 1999 Budget Request	FY 2000 Budget Request
Operation and Maintenance, Southwestern Power Administration	(to be determined)	0	10	10
Subtotal, Southwestern 89X0303		0	10	10
Total		0	10	10

Program Contact:
Name: Colin Kelley
Telephone: (918) 595-6615

Environment, Safety & Health Crosscut

Summary

Southwestern has no non-compliance issues to resolve. We believe this to be the result of a very active and effective core Environment, Safety and Health (ES&H) program. The basic strategy for assuring continued compliance with applicable laws, regulations, and Department of Energy orders and policies and to pursue excellence with demonstrable progress in program performance, is to maintain a high level of environmental and safety awareness with constant self-assessment and re-evaluation of the overall program.

Southwestern's management and direction for the ES&H program is to maintain a high level of awareness. This is accomplished through increased involvement of supervisors, managers, and operating-level employees; determining root causes of and identifying appropriate follow-up action; implementing appropriate recommendations; conducting self-assessment evaluations; and prioritizing activities for enhancing the program.

The major planning assumptions are to identify methods to improve the design, operation, and maintenance of Southwestern's safety and environmental programs to achieve a level of "excellence".

The most important safety issue at Southwestern is that of assuring the protection of employees from work place hazards. Environmentally, the most important issue is the continuing actions to maintain a compliance program.

Top-level objectives and key milestones for the functional areas are:

- Involve employees at the operational level.
- Improve training of workers.
- Modify plant hardware and equipment to protect workers and the environment during operation and maintenance processes.
- Reduce risks by identifying potential hazard and design barriers and/or making changes to work processes.
- Conduct self-assessments and continuously re-evaluate work processes.
- Implement strategies.

Facility Functional Area Summaries

There is only one full time FTE working in the safety functional areas. In the environment there is one full time FTE and three part time FTE.

Major activities are to improve management and oversight activities by planning and providing training; promoting continuous self-assessment; inspecting and monitoring for quality assurance; and modifying work procedures and equipment to reduce exposure to risk to the workers and the environment. Budget assumptions appear reasonable and prudent.

Safety Program Description

This crosscut consists of all Safety and Health (S&H) functional areas rolled into one and consists of activities such as:

- Fire Protection
- Industrial Hygiene
  - Hazard Communication
  - Chemical Inventory, Tracking, and Storage
  - Hazard Recognition and Evaluation
  - Personnel Protection
  - Physical, Biological, and Physiological Stresses
  - Hazardous Waste Operation and Emergency Response
  - Ergonomics/Prevention of Repetitive Motion Injuries
- Industrial Safety
  - Electrical Safety
  - Machinery and Machine Guarding
  - Compressed Gas and Pressure Systems Safety
  - Hoisting, Rigging, and Material Handling
  - Lock-out/Tag-out
  - Confined Space Controls
  - Platform, Manlifts, and Scaffolding
  - Walking and Working Surfaces Safety
  - Cutting, Welding, Brazing Safety
  - Hand & Portable Powered Tools & Other Hand-Held Equipment Safety
  - Explosive and Hazardous Substance Handling
  - Construction Safety
  - Facility Egress
  - Personnel Protection

- Occupational Medical Services
  - Physical Health Evaluations
  - Medical Treatment and Triage
  - Rehabilitation/Lost Work Days Program
  - Medical Records and Documentation
- Transportation Safety
  - Packaging and Transportation
  - Aviation Safety
  - Motor Vehicle Safety
- Management and Oversight
  - Independent Audits and Appraisals
  - Internal Audits and Surveillance
  - S&H Inspections and Program Reviews

Appraisal

Risks associated with elements in core program:

- Public Safety - There is a very high likelihood that without a S&H Program, the impact to the public would be excessive exposure and/or injury. Southwestern has nearly 1,380 miles of transmission lines in a three-state area. These lines cross bodies of water used for recreation as well as farms, public roads, and countrysides inhabited by hunters, recreationists, etc.

  With an active program, the impact to the public is reduced to a low-likelihood of occurrence of excessive exposure and/or injury. The program promotes safety awareness. It reduces exposure to hazards and prevents accidents and injuries through the use of barriers and guards. It ensures compliance with regulations and guidelines for public safety.

- Site Personnel Safety - Without an adequate S&H Program, the Southwestern employees' exposure to a catastrophic injury or illness is very high due to the nature of the work of the agency. With the improvement of the current S&H Program, the likelihood of occurrence is reduced to a low level. Activities for improving the program are:
  - improved training procedures and courses;
  - improved inspection and maintenance procedures; and
  - modified plant hardware to protect workers, reduce safety and health risks, promote safety awareness, and ensure compliance with guidelines.

- Compliance - Without the S&H Program, it is very likely that Southwestern would not be in compliance with DOE Safety and Health orders. With the S&H, compliance is ensured, enhanced, and adhered to.
- Mission Impact - Without this core activity, there is a slight likelihood that the facilities would be shutdown for less than six months because of non-compliance or a catastrophic accident. With the S&H, compliance and accident prevention are of primary concern. Improvements in this core activity will further reduce the likelihood of occurrence impacting the mission of Southwestern.

Description

This activity is essential to the continuously performed activities and to maintaining or exceeding the current level of compliance.

- New Safety Position - Current staffing is one FTE. In order to fully implement Federal OSHA requirements, DOE Orders and Guidelines, and PMA power system safety standards, another FTE is necessary. Southwestern has facilities in three states, maintaining approximately 1,400 miles of transmission lines and operating 24 substations.

Appraisal

- Public Safety - An additional FTE will ensure a more in-depth presence of S&H in all activities. There is a high likelihood that the public could be impacted by injury or exposure without strengthening this force. With the additional FTE, the operation and maintenance activities, as well as improvement in compliance of regulations and standards, will be more readily achieved.
- Site Personnel Safety - The additional FTE will assure that the likelihood of a catastrophic injury or illness will be reduced from a high level to a low level. The additional FTE will not eliminate the possibility of injury or illness to site personnel but will reduce the number of occurrences. The addition will certainly assure more frequent oversight and guidance, improve quality of operations, enhance safety awareness, provide more in-depth analysis, improve compliance levels, and expand the activities of the S&H Program.
- Compliance - Without the additional FTE, the compliance level will have deficiencies due to the fact that the present staff cannot give quality time to each regulation and program as is necessary.
- Mission Impact and Investment - Would be impacted proportionately as they are impacted in the core S&H Program.

Description

This crosscut is a consolidation of all the environmental functional areas plus emergency preparedness and consists of the following activities:

- Protection of Air Quality
  - Source Monitoring Activities
- Protection of Water Quality
  - Groundwater Protection Management
  - Permitting Application and Maintenance
  - Discharge Facility Treatment/Control Operation and Maintenance
  - Effluent Monitoring and Environmental Surveillance for Surface Water
  - Spill Prevention, Control and Countermeasure Plans
- Solid Waste Generation and Control
  - Waste Characterization and Certification
  - Waste Reduction and Minimization
  - Accumulation, Handling, Treatment, and Disposal
- Control of Toxic Substances
  - Pesticides
  - Polychlorinated Biphenyls and Oil-Filled Storage Equipment
  - Sara Title III, Recordkeeping and Reporting
  - Toxic Substances Control Act Compliance
  - Spill/Release Response and Reporting
- Management, Oversight and Reporting
  - Environmental Compliance, Planning and Review
  - General Environmental Surveillance and Monitoring
  - National Environmental Policy Act Activities
  - Program Evaluation and Reporting
  - Internal Communications and Community Outreach and Awareness

- Emergency Preparedness
  - Emergency Planning
  - Emergency Equipment
  - Emergency Operations, Drills, and Procedures

Appraisal

- Compliance - Without an Environmental Program, Southwestern would not be in compliance with applicable DOE orders and regulations. With a program, Southwestern can maintain compliance while striving for excellence.
- Mission Impact - Failure to meet environmental requirements could delay completion of facilities needed to fulfill Southwestern's mission.
- Environmental Impact - Lack of an environmental program could result in damage to either surface or ground water or contaminate soil. Also, fish and wildlife or natural habitat could be adversely affected.

Description

The current staff level is one FTE. Additional resources needed to maintain compliance and pursue excellence in the following Environmental functional areas can be presented through third party support:

- Protection of Air Quality
- Protection of Water Quality
- Solid Waste Generation and Control
- Control of Toxic Substances
- Management, Oversight and Reporting
- Emergency Preparedness
- Herbicides

Appraisal

- Compliance - Both Federal and DOE compliance regulations are continually changing. This makes it difficult to stay abreast of the changes, particularly with the DOE regulations.
- Mission Impact - Mission may be impacted by failure to consider environmental issues early because of lack of resources.
- Investment Impact - Investment may be impacted by lack of timely response to environmental concerns such as minor loss of oil.

- Environmental Impact - Lack of environmental program development and oversight could result in damage to either surface or ground water or soil contamination. Also, fish and wildlife or natural habitat could be adversely affected.

Five-Year Environment, Safety & Health Budget

(dollars in thousands)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003
Program Management & Implementation					
Environment	358	369	369	369	369
Safety	406	418	418	418	418
Total	764	787	787	787	787

FY 2000 Environment, Safety & Health Plan

	(dollars in thousands) FY 2000
Core Safety & Health	180
Core Environment	192
Subtotal	372
Support & Implementation - Safety	238
Support & Implementation - Environment	177
Subtotal	415
Total	787

Western Area Power
Administration

Construction, Rehabilitation, Operation and Maintenance

Proposed Appropriation Language

For carrying out the functions authorized by title III, section 302(a)(1)(E) of the Act of August 4, 1977 (42 U.S.C. 7152), and other related activities including conservation and renewable resources programs as authorized, including official reception and representation expenses in an amount not to exceed $1,500, [$203,000,000]*$171,471,000*, to remain available until expended, of which [$193,787,000]*$160,286,000* shall be derived from the Department of the Interior Reclamation Fund: *Provided*, That of the amount herein appropriated, $5,036,000 is for deposit into the Utah Reclamation Mitigation and Conservation Account pursuant to title IV of the Reclamation Projects Authorization and Adjustment Act of 1992.

Falcon and Amistad Operating and Maintenance Fund

Proposed Appropriation Language

For operation, maintenance, and emergency costs for the hydroelectric facilities at the Falcon and Amistad Dams, [$1,010,000] *$1,309,000* to remain available until expended, and to be derived from the Falcon and Amistad Operating and Maintenance Fund of the Western Area Power Administration, as provided in section 423 of the Foreign Relations Authorization Act, Fiscal Years 1994 and 1995.

Western Area Power Administration

Program Mission

The mission of the Western Area Power Administration (Western) is to market and deliver reliable, cost-based hydroelectric power and related services. Western provides electric power to over 600 customers over a 1.3-million-square-mile area in the central and western United States. Western will repay the Federal investment for which it is responsible within the time frames established by law and regulations.

Western's Goals

- Remarkable Service
- Superior Products
- Delighted Customers

Program Objectives

- To be an organization of highly skilled, highly productive, customer-oriented employees who carry out our mission in concert with our desired culture, core competencies and leadership qualities.
- To strengthen our partnerships with the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers and the International Boundary and Water Commission to manage power delivery costs, and to improve power system reliability and efficiency.
- To strengthen partnership programs with our customers, constantly looking for opportunities to support both their and Western's success.
- To participate in decision-making processes with natural resource agencies whose operating decisions significantly affect Federal power rates and repayment obligations.
- To limit increases in annual operating expenses to keep our rates and the rates of our customers competitive in the markets we serve.
- To continuously work with our customers to secure alternative financing of Western's programs.
- To be proactive in the shaping of the competitive utility industry, primarily acting as an advocate for power system reliability.
- To enhance the productivity of our workforce to improve our service to our customers through continuous streamlining of our work processes and seeking relief from burdensome regulations.

Performance Measures

Western's performance measures support Department of Energy's Strategic Plan and Comprehensive National Energy Strategy. These measures are aimed at achieving specific outcomes including establishment of rates sufficient to make full and timely repayment to the U.S. Treasury; maintenance of the health and safety of all employees; and development and achievement of the operation of a reliable, low-cost, environmentally-sound power system which facilitates competitive, efficient and reliable power deliveries. Outputs include:

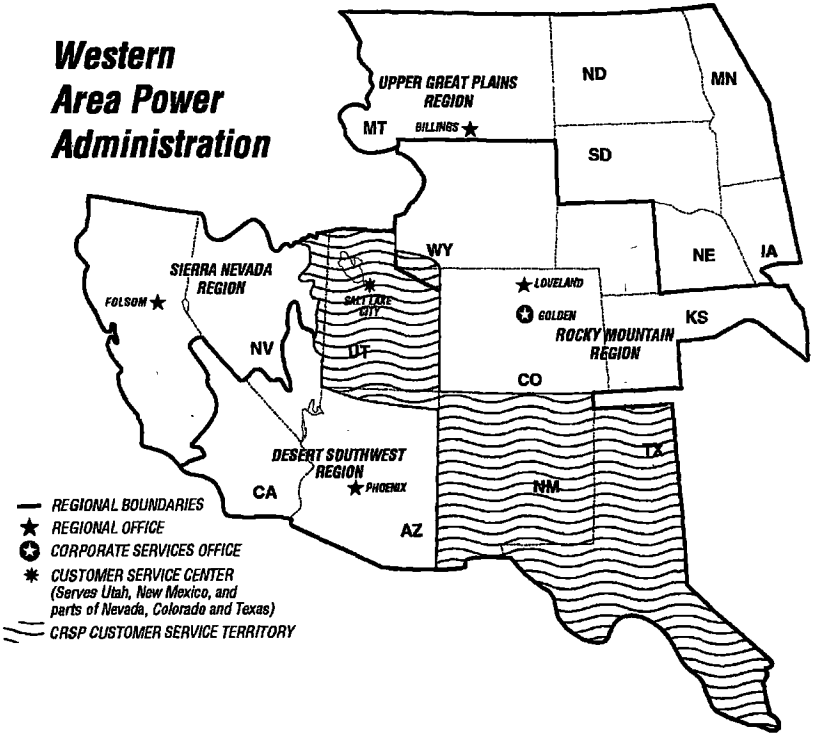
- *Transmission System Performance*: Western's goal is to ensure that each power system control area operated by Western receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Electric Reliability Council performance standard. Control criteria compliance are measures used to determine if utility employees, control equipment, and generation are responsive to the minute-by-minute load changes throughout the year. Good control performance is required to maintain system reliability and to reduce losses, as well as maintain equity among interconnected systems. Western's annual average compliance ratings in FY 1998 were 183.3 for CPS1 and 98.2 for CPS2, well exceeding the North American Electric Reliability Council (NERC) minimum of 100 and 90, respectively. Industry averages were 181.74 and 97.5, respectively.
- *Safety*: Western's goal is to achieve a safety performance of at most a 3.3 frequency rate for recordable injuries per 200,000 hours worked, or the Bureau of Labor Statistics industry rate, whichever is lower. Total recordable case (accident) rate measures the recordable accident frequency rate by multiplying the number of recordable injuries by 200,000, then dividing by the total hours worked. Western's calendar year 1997 rate of 1.9 is well below the industry average of 5.7. Final CY 1998 data are not yet available.
- *Cost Growth*: Western's goal is that the change in actual regular operation and maintenance obligations from one year to the next is no greater than the annual rate of inflation for the same period. In FY 1998, regular operation and maintenance obligations were 5.6 percent less than FY 1997. The annual rate of inflation for that same period was 1.5 percent.
- *Repayment of Power Investment*: Western's goal is to meet planned repayment of principal on power investment. As a result of an above-average water year and higher power sales, Western's FY 1997 payment was 144.6 percent of planned payment. Final FY 1998 information is not yet available.

Significant Accomplishments and Program Shifts

- In FY 2000, Western will not seek appropriations for the Purchase Power and Wheeling (PPW) program funded in Western's Construction, Rehabilitation, Operation and Maintenance (CROM) account. In addition, current alternative financing arrangements (net billing, bill crediting, and reimbursable) for PPW will be terminated. Customers are expected to provide for these financing arrangements directly with suppliers, thereby reducing both Western's costs and revenues in FY 2000 by $141 million. Existing long-term power purchase and power sale contractual commitments not funded by Western's customers will be terminated.

- Beginning in FY 2000, Western will pay for Boulder Canyon Project operations directly from the Colorado River Dam Fund (CRDF). Previously, this Project was included in Western's CROM account, and funds were provided from the CRDF by transfer.
- In FY 1998, Western
  - Sold 45.0 billion kilowatt-hours of energy; and
  - Collected gross operating revenues of $864.9 million.
- While we have effectively completed our Transformation initiative bringing requirements for full-time equivalents (FTE) down from 1,504 in FY 1994 to 1,330 in FY 1999, we are continuing to vigorously pursue efficiency opportunities. The FY 2000 budget request assumes a further decrease of 40 FTE in our business requirements.
- Western operated and maintained 16,854 circuit miles of high-voltage transmission lines, 258 substations, and associated power system control, communication and electrical facilities located across 15 western states; marketed low-cost, reliable hydroelectric power to 629 power customers, and provided system operations and load dispatching, power billing and collection, power marketing, power resource planning, energy services, technology transfer, security and emergency management for 15 separate power projects. Western, once again, exceeded both the NERC and industry averages for transmission system performance.
- Western is in the process of separating its power marketing and transmission system reliability functions in response to the Federal Energy Regulatory Commission's (FERC) Order Nos. 888 and 889. Western's challenge was to integrate the legal requirements of our 11 separate rate-setting systems into one single tariff, while accommodating the diverse nature of the 15 projects from which we market power and/or transmission services. Western's tariff package was submitted to FERC under a nonjurisdictional docket on December 31, 1997. Western filed its Standards of Conduct for power marketing and operations employees with FERC on December 9, 1998. Western owns, operates, and/or participates in electronic systems to share information about available transmission capacity within the regions in which it operates.
- Western is the Federal representative on the NERC compliance subcommittee. The subcommittee has begun NERC's effort to develop a mandatory system to ensure compliance with the reliability standards and criteria. Additionally, Western played a major role in developing the Reliability Management System (RMS) used within Western Systems Coordinating Council (WSCC). RMS is the first contract-based approach to ensure the reliability of the interconnected transmission system.
- Western's Electric Power Training Center developed and now offers a course specifically designed to prepare participants for NERC's certification examination. The course focuses on NERC operating policies, conceptual underpinnings and practical application.
- Western has consolidated the functions of the Montrose Control Center with those of the Desert Southwest and Rocky Mountain Control Centers. The change provides enhanced coordination with emerging regional transmission groups, increased operational flexibility, and saves money by eliminating the need for a replacement supervisory control and data acquisition system at one site.

- Western continued as a major participant in the development of four independent system operators (ISO) across our service area. Although not a member, Western holds a position on the California ISO Governing Board representing the public buyers and sellers class.
- Western developed and operates two of four regional security coordination centers in the West in response to the Department's initiative on electric reliability. To improve national electric reliability, security coordination centers actively monitor electric power system conditions on a real-time basis to observe and mitigate potential problems as well as react to system emergencies as they develop. If a system breakup occurs, the security coordination center will direct restoration efforts.
- Western initiated 14 power and rate actions in FY 1998, 12 for rate decreases or extensions, and two for rate increases to meet project repayment needs. All were approved by FERC without exception. Western committed to maintain rate stability across our major systems through FY 2002.
- Western completed contracts to sell Federal power to 26 Native American tribes in the Upper Midwest as part of the Pick-Sloan Missouri Basin Program's Post-2000 marketing program. This complex and innovative effort involved current and new customers in partnerships to bring the benefits of the Federal power program to these Tribes.
- Western initiated a Year 2000 project to identify and correct potential problems relating to the millennium rollover for our mission-essential systems and other equipment and software. Additionally, we are working with the Bureau of Reclamation and the U.S. Army Corps of Engineers, our primary hydropower suppliers, to ensure that both generation-agency power and related systems are Y2K compliant in our service area.
- Western exceeded Welfare-to-Work hiring initiatives by hiring six individuals into entry-level jobs.
- Western received DOE's Small Business Award in recognition of our commitment to contract with small and disadvantaged businesses. Our reengineering efforts to reduce regulatory hurdles and barriers in government procurement processes resulted in two "Hammer" awards from Vice President Gore's National Performance Review.
- Western continued development, documentation and training initiatives associated with commercial, off-the-shelf financial and maintenance management systems which are scheduled for implementation in FY 1999.
- Western successfully concluded a contract, through the General Services Administration, for a new building for its corporate services office. The building will result in reduced annual lease costs. Ground-breaking was held on September 23, 1998, with occupancy scheduled for late in FY 1999.
- Western continued to exceed agency and industry-wide safety goals, reducing accident and severity rates to an all-time low.


Western
Area Power
Administration
UPPER GREAT PLAINS
REGION
MT
BILLINGS
ND
MN
SD
NE
IA
WY
LOVELAND
GOLDEN
KS
ROCKY MOUNTAIN
REGION
SIERRA NEVADA
REGION
FOLSOM
SALT LAKE
CITY
NV
UT
CO
DESERT SOUTHWEST
REGION
PHOENIX
CA
AZ
NM
TX
REGIONAL BOUNDARIES
REGIONAL OFFICE
CORPORATE SERVICES OFFICE
CUSTOMER SERVICE CENTER
(Serves Utah, New Mexico, and
parts of Nevada, Colorado and Texas)
CRSP CUSTOMER SERVICE TERRITORY

Construction, Rehabilitation, Operation and Maintenance

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Construction, Rehabilitation, Operation and Maintenance Account					
Program Direction	108,331	107,383	0	107,383	104,537
Operation and Maintenance	39,746	36,469	0	36,469	35,096
Construction and Rehabilitation	24,243	20,802	0	20,802	26,802
Purchase Power and Wheeling	54,886	53,886	0	53,886	0
Utah Mitigation and Conservation	5,592	5,036	0	5,036	5,036
Total Program, Operating Expenses	232,798	223,576	0	223,576	171,471
Planned Use of Prior Year Balances	-41,081	-20,576	0	-20,576	0
Total Budget Authority Request	191,717	203,000	0	203,000	171,471
Current Budget Authority	(189,043)	(203,000)		(203,000)	(171,471)
Permanent Budget Authority	(2,674)	(0)		(0)	(0)

Public Law Authorizations:

Public Law 57-161, "The Reclamation Act of 1902"
Public Law 95-91, "Department of Energy Organization Act" (1977)
Public Law 102-486, "Energy Policy Act of 1992"
Public Law 66-389, "Sundry Civil Appropriations Act" (1922)
Public Law 76-260, "Reclamation Projects Act of 1939"
Public Law 80-790, "Emergency Fund Act of 1948"
Public Law 102-575, "Reclamation Projects Authorization and Adjustment Act of 1992"
"Economy Act" of 1932, as amended
"Interior Department Appropriation Act of 1928" (44 stat. 957)

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Western Area Power Administration	232,798	223,576	171,471	-52,105	-23.3%
Planned Use of Prior Year Balances	-41,081	-20,576	0	+20,576	+100.0%
Total, Construction, Rehabilitation, Operation and Maintenance Account	191,717	203,000	171,471	-31,529	-15.5%

Site Description

Western Area Power Administration's (Western) service area covers 1.3-million square miles in 15 states. We sell power to 629 wholesale customers including 285 municipalities, 50 cooperatives, 18 public utility and 48 irrigation districts, 54 Federal and 54 State agencies, 30 investor-owned utilities, 21 marketers, and 69 Reclamation customers. They, in turn, provide retail electric service to millions of consumers in these central and western states: Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah and Wyoming.

Western annually markets and transmits more than 10,000 megawatts of power from 55 hydropower plants. We sell about 40 percent of regional hydroelectric generation. Western also markets the United States' entitlement from the coal-fired Navajo Generating Station near Page, Arizona.

Western operates and maintains an extensive and complex high-voltage transmission system to deliver power to our customers. Using this 16,854-circuit-mile Federal transmission system, Western markets and delivers reliable electric power to most of the western half of the United States. Western's system is the third largest in the United States.

The power facilities are made up of 14 multipurpose water resource projects and one transmission project. The systems include Western's transmission facilities and power generation facilities owned and operated by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers and the International Boundary and Water Commission.

Power sales, transmission operations and engineering services for our system are accomplished by our employees at 48 duty stations located throughout our service area. These include our Corporate Services Office in Golden, Colorado, and four customer service regional offices in Billings, Montana; Loveland, Colorado; Phoenix, Arizona; and Folsom, California. The Colorado River Storage Project is also supported by a Customer Service Center in Salt Lake City, Utah. System operations and maintenance are managed at offices in Bismarck, North Dakota; Fort Peck, Montana; Huron, South Dakota; Montrose, Colorado; and Watertown, South Dakota.

Construction, Rehabilitation, Operation and Maintenance
Program Direction

Mission Supporting Goals and Objectives

Western Area Power Administraton's (Western) Program Direction activity provides compensation and all related expenses for the workforce that operates and maintains Western's high-voltage interconnected transmission system and associated facilities and those that plan, design, and supervise the construction of replacements, upgrades and additions (capital investments) to the transmission facilities.

Western operates and maintains the transmission system to ensure an adequate supply of reliable electric power in a clean and environmentally-safe, cost-effective manner throughout its 15-state service territory. Western achieves continuity of service by maintaining its power system at or above industry standards, rapidly restoring service following any system disturbances, mitigating adverse environmental impacts, performing clean-up activities, and maximizing the benefits gained from non-firm energy sales. Additionally, Western operates two of the Western Systems Coordinating Council's security centers (the Rocky Mountain and Desert Southwest power areas).

Western markets power generated at 55 hydropower plants which are operated primarily by the Bureau of Reclamation, the Corps of Engineers, and the International Boundary and Water Commission. Western also markets the United States' entitlement from the Navajo coal-fired powerplant near Page, Arizona.

In concert with our customers, Western reviews required replacements and upgrades to its existing infrastructure to sustain reliable power delivery to our customers and to contain annual maintenance expenses. The timing and scope of these replacements and upgrades are critical to assure that Western's facilities do not become the "weak link" in the interconnected system. Western pursues opportunities to join with neighboring utilities to jointly finance activities, which result in realized cost savings and/or increased efficiencies for all participants.

Performance Measures

The Program Direction activities support the performance measures presented under Program Mission.

- Highly-skilled staff respond to minute-by-minute load changes to meet or exceed North American Electric Reliability Council and industry averages for Transmission System Performance. Craftsmen maintain or replace equipment to assure its capability for reliable delivery of power. The crews also rapidly restore the system following any disturbance.
- Program Direction activities support Western's Safety measurement by making safety a priority in each and every task because of the extreme hazards associated with a high-voltage electrical system. Safety is not a separate program but is integrated into all procedures and jobs.

- The Cost Growth measurement is a direct reflection of Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system, including the associated Program Direction activities, while not compromising the reliability of power deliveries. Controlling costs is vital to the continuing health of our organization as we move into an era of increased competition. High costs contribute to higher rates, reducing our competitive position and that of our customers.
- Program Direction activities support the Repayment of Power Investment measurement by providing 24-hour/day reliable electric power delivery to our customers and maximizing revenues from non-firm power sales.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salary & Benefits	73,721	75,629	72,006	-3,623	-4.8%
Travel	7,761	7,993	7,634	-359	-4.5%
Support Services	9,193	8,291	9,827	+1,536	+18.5%
Other Related Expenses	17,656	15,470	15,070	-400	-2.6%
Total, Program Direction	108,331	107,383	104,537	-2,846	-2.7%
Use of Prior Year Balances	-23,205	-15,745	0	+15,745	+100.0%
Total, Program Direction Budget Authority	85,126	91,638	104,537	+12,899	+14.1%
Current Budget Authority	(82,952)	(91,638)	(104,537)		
Permanent Budget Authority	(2,174)	(0)	(0)		
Full-Time Equivalents (FTE)	1,071	1,169	1,075	-94	-8.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Salary and Benefits			
Salaries and benefits for 1,075 Federal employees to operate and maintain, on a continuing, on-going basis, Western's high-voltage interconnected transmission system, comprised of 16,854 miles of line, 258 substations, and associated power system control, communication and general plant facilities. Dispatchers provide 24-hour-a-day operation of four dispatching and two security centers. Staff provide continuing services such as system operations, power billing and collection, power marketing, power scheduling, energy services, technology transfer, environmental, safety, security and emergency management activities. Staff inspect construction activities in progress (identified in the Construction and Rehabilitation activity) to ensure quality results and safe working methods. General power resources planning and preconstruction activities, including planning, environmental clearance, collection of field data, design of facilities, and issuance of specifications for future rehabilitation and upgrades of existing transmission lines continue. Staff evaluate general power resources, collaborating and planning with customers and other members of the interconnected transmission system to identify the most effective transmission system improvements to maximize benefits to all participants. Based on historical data, a 3 percent inflation factor has been applied	73,721	75,629	72,006
Travel			
Transportation and per diem allowance for day-to-day performance of duties of Federal staff, including crews who maintain the transmission system in a 15-state area, and transportation of things. The remote and rural locations that we serve does lead to less competitive pricing. Estimates are based on historical travel costs, adjusted for anticipated escalation of airline fares, and planned activity.	7,761	7,993	7,634

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Support Services			
Support services including automated data processing, warehousing, computer-aided drafting, engineering, and general administrative support. The request is based on exercising the one-year option for the current level of contract support. The increase is for computer-aided drafting and engineering support which was inadvertently included previously in the Operation and Maintenance (O&M) budget request	9,193	8,291	9,827
Other			
Other related expenses, including but not limited to, rental space, utilities, supplies and materials, telecommunications, personal computers, printing and reproduction, training tuition fees, distribution of multi-project facilities costs, Department of Energy's (DOE) working capital fund assessment, and distribution of National Archive and Records Administration costs. Rental space costs assume the GSA-inflation factor, adjusted by the number of employees funded in this account. DOE's working capital fund portion in this account increased 26 percent and is primarily attributed to costs associated with payroll/personnel systems including preparation of withholding tax statements. Other costs are based on historical usage and actual costs of similar items	17,656	15,470	15,070
Total, Program Direction	108,331	107,383	104,537

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salary and Benefits	
■ Decrease in salaries and benefits is the result of 94 fewer FTE working on activities funded through this Account. The decrease is comprised of: 40 FTE due to efficiency gains achieved by Western; 26 FTE due to the use of Western's authority to spend directly out of the Colorado River Dam Fund (CRDF) for activities associated with the Boulder Canyon Project; and 28 FTE transferred to project activities funded from the Colorado River Basins Power Marketing Fund. Work is prioritized crossing all funding mechanisms based on need. Therefore, fluctuations in number of FTE required to perform the work in any given account may occur from year to year	-3,623

	FY 2000 vs. FY 1999 ($000)
Travel	
■ Decrease in travel is due to fewer FTE and their associated travel being funded through this Account	-359
Support Services	
■ Increase in support services is for computer-aided drafting and engineering support which was inadvertently included previously in the O&M budget	+1,536
Other	
■ Decrease in other related expenses is primarily attributed to the exclusion of costs associated with the Boulder Canyon Project which were previously included in this Account, offset by an increase in software and personal computer upgrades to more fully implement Western's new financial system. The Boulder Canyon Project costs are now directly funded through receipts in the CRDF and are identified in its own section.	-400
Total Funding Change, Program Direction	-2,846

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Economic and Environmental Analysis	0	0	0	0	N/A
Test and Evaluation Studies	0	0	0	0	N/A
Total, Technical Support Services	0	0	0	0	N/A
Management Support Services					
Management Studies	216	352	165	-187	-53.1%
Training and Education	69	81	85	+4	+4.9%
ADP Support	3,270	2,760	4,314	+1,554	+56.3%
Administrative Support Services	5,638	5,098	5,263	+165	+3.2%
Total, Management Support Services	9,193	8,291	9,827	+1,536	+18.5%
Total, Support Services	9,193	8,291	9,827	+1,536	+18.5%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	1,043	1,065	1,024	-41	-3.8%
Working Capital Fund	254	277	349	+72	+26.0%
Printing and Reproduction	311	315	325	+10	+3.2%
Rental Space	3,012	3,102	2,891	-211	-6.8%
Software Procurement/Maintenance Activities/Capital Acquisitions	5,035	4,073	4,835	+762	+18.7%
Other	8,001	6,638	5,646	-992	-14.9%
Total, Other Related Expenses	17,656	15,470	15,070	-400	-2.6%

Operation and Maintenance

Mission Supporting Goals and Objectives

Western Area Power Administration's (Western) operation and maintenance (O&M) activity supports the Department of Energy's Strategic Plan to promote secure, competitive, and environmentally responsible energy systems that serve the needs of the public. Western ensures an adequate supply of reliable electric power in a safe, cost-effective manner, and achieves continuity of service throughout its 15-state service territory by maintaining its power system at or above industry standards, rapidly restoring service following any system disturbance, mitigating adverse environmental impacts, performing clean-up activities, and maximizing the revenues gained from non-firm energy sales.

Supplies and materials, such as wood poles, instrument transformers, meters and relays must be procured to provide necessary resources to respond to routine and emergency situations in Western's high-voltage interconnected transmission system. Technical services, such as waste management disposal, environmental impact analyses, and pest and weed control are utilized as needed.

Western's planned replacement and addition activity is based on an assessment of age and the maintenance/frequency of problems of individual items of equipment, availability of replacement parts, safety of the public and Western's personnel, environmental concerns, and an orderly workplan. The workplans, coordinated with Western's power customers who ultimately bear the burden of all Western expenses, reflect an overall sustainable level of effort, with shifts in emphasis between categories (i.e. electrical versus communication equipment) in any given year.

Electrical equipment replacements, such as circuit breakers, transformers, insulators, revenue meters, switches, control boards, relays and oscillographs must be acquired to assure reliable service to Western's customers. System component age, environmental concerns, and risk to system reliability necessitate orderly replacement before significant problems develop.

Replacement, upgrade and installation of microwave, fiber optics, supervisory control and data acquisition, and other communication and control equipment continues to provide increased system reliability and operation, and to reduce maintenance and equipment costs.

Capitalized movable equipment, such as special purpose vehicles (e.g. cranes, auger trucks, manlifts), special purpose equipment (e.g. pole trailers, industrial tractors, brush chippers), specialized test equipment (e.g., motion analyzers and ductor tester equipment), computer-aided engineering equipment, office equipment, ADP equipment and software, must be upgraded and replaced.

The personnel expenses and personnel performance accomplishments associated with the O&M activity are combined with those of the Construction and Rehabilitation activity and are reflected in the Program Direction section of Western's budget request.

Performance Measures

The O&M program supports the performance measures presented under Program Mission.

- Well-maintained equipment, the resource availability to rapidly restore service following any system disturbance, and the ability of staff to respond to minute-by-minute changes in load requirements are all directly tied to the Transmission System Performance measure. Timely replacement of old or failing electrical equipment prevents sudden failure, unplanned outages, and possible regional power system disruptions.
- The O&M program supports the Safety measurement by placing safety first in all of its day-to-day operations, removing environmental hazards, and replacing equipment that may create a safety hazard for the public and Western's personnel. Each maintenance activity begins with a discussion of safe-working procedures. The O&M program also indirectly supports public safety by minimizing or preventing electrical outages and the attendant safety risks and concerns.
- The Cost Growth measurement is a direct reflection of Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system while not compromising the reliability of power deliveries.
- The O&M program supports the Repayment of Power Investment measurement by providing 24-hour/day reliable electric power delivery to our customers, thus securing revenues for repayment.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Regular Operations and Maintenance	24,735	21,631	19,844	-1,787	-8.3%
Replacements and Additions	15,011	14,838	15,252	+414	+2.8%
Total, Operations and Maintenance	39,746	36,469	35,096	-1,373	-3.8%
Planned Use of Prior Year Balances	0	-2,816	0	+2,816	+100.0%
Total, O&M Budget Authority	39,746	33,653	35,096	+1,443	+4.3%
Current Budget Authority	(39,246)	(33,653)	(35,096)		
Permanent Budget Authority	(500)	(0)	(0)		

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Regular Operations and Maintenance			
■ Supplies and materials necessary to respond to routine and emergency situations in Western's high-voltage interconnected transmission system. The request is based on projected workplans for activities funded from this account. Estimates are based on historical data of actual supplies needed to maintain the transmission system reliably, including emergency situations such as ice storms and tornadoes. Costs are based on recent procurement of similar items. The decrease primarily reflects the transfer of computer-aided drafting/engineering support costs which were inadvertently included in this section prior to this request. The costs are correctly reflected in the Program Direction section of the FY 2000 request as directed by Congress	24,735	21,631	19,844
Replacements and Additions			
■ Electrical equipment replacements, including treatment and/or replacement of wood poles to extend the life of aging, deteriorating transmission lines. Costs are based on analysis of system operation/maintenance requirements and concerns, customer-coordinated workplans, actual costs of recent similar projects, and bottom-up budgeting techniques. The increase reflects an increase in treatment and replacement of woodpoles on several transmission lines to extend their service life.	5,901	5,672	7,811

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Replacement/upgrade of microwave, supervisory and control data acquisition, and other communication and control equipment, including staged replacement to meet new Federal Communications Commission and National Telecommunications and Information Administration regulations requiring Western to move to narrow communications band spectrums by 2005. Costs are based on analysis of system operation/maintenance requirements, customer-coordinated workplans, actual costs of recent similar projects, and bottom-up budgeting techniques. The decrease reflects a lower level of equipment purchases associated with the movement to narrow communications band spectrums.	3,523	3,593	1,998
■ Capitalized movable equipment needed to support the O&M of the interconnected power system. Replacement needs are based on age, reliability, and safety of equipment, customer-coordinated review, cost analysis of rebuild versus replacement, availability of replacement parts, and obsolescence of diagnostic maintenance tools. Costs are determined using actual costs of similar items	5,587	5,573	5,443
Total, Replacements and Additions	15,011	14,838	15,252
Total, Operations and Maintenance	39,746	36,469	35,096

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Regular Operations and Maintenance	
■ Decrease in regular O&M activities is primarily attributed to transfer of computer-aided drafting/engineering support costs which were inadvertently included with these costs in FY 1999. The costs are correctly reflected in the Program Direction section of Western's FY 2000 request	-1,787
Replacements and Additions	

	FY 2000 vs. FY 1999 ($000)
■ Increase in replacements and additions primarily attributed to the treatment and replacement of wood poles on several transmission lines such as the Parker-Gila line (Arizona), the Fort Randall-Tyndall line (South Dakota) and the Tracy-Ignacio line (California) due to age and deterioration (+$2,139,000). Costs associated with replacement of communication and control equipment decrease in FY 2000 reflecting a slightly reduced level of equipment purchases associated with the movement to narrow communications band spectrums by 2005. This work is staged over several years with costs fluctuating between equipment purchases and installation efforts (-$1,595,000). Capitalized movable equipment purchases decrease slightly (-$130,000)	+414
Total Funding Change, Operation and Maintenance	-1,373

Construction and Rehabilitation

Mission Supporting Goals and Objectives

Western Area Power Administration's (Western) construction and rehabilitation (C&R) activity emphasizes replacement and upgrading of existing electrical system infrastructure to sustain reliable power delivery to our customers, to contain annual maintenance expenses, and to retain the value of our assets. In FY 2000, Western's transmission system will have over 16,850 circuit miles of line and 258 substations. In FY 2000, 896 of the 7,928 miles of wood pole line, or 11 percent, will be over 50 years old, and 3,733 miles, or 47 percent, will be between 41 and 50 years old. Western is continually testing, treating, and replacing individual wood poles and hardware to delay the need for replacing an entire transmission line. As substation equipment (such as power transformers, circuit breakers, and control equipment) reaches the end of its useful life, maintenance costs increase, replacement parts become unavailable, risk of outages increases, and system reliability declines. Western will have 145 transformers and 108 breakers over 41 years old in FY 2000. The replacement of this equipment is systematically planned over a 10-year period. All replacement plans are coordinated with our customers to help establish the scope of replacement at specific substations. When upgrades or additional capacity are required, Western actively pursues opportunities to join with neighboring utilities to jointly finance activities, which result in realized cost savings and increased efficiencies for all participants.

In order for Western and its customers to remain competitive in the changing utility industry, Western has aggressively reduced its capital investment program. From levels around $110 million in FY 1992 through FY 1994, Western has reduced its total C&R program to a base of about $40 million since FY 1996 (total program includes equipment, contracts, related expenses, program direction and planned use of prior year balances). Our FY 2000 program level is $6.0 million more than FY 1999, and about $2.6 million above the FY 1998 level. Western continues to refine a long-term C&R program level that will maintain the reliability of, and the Government's investment in, Western's power facilities while minimizing effects on power rates. Our challenge has been to evaluate Western's facilities which were built 40 to 50 years ago, and develop a systematic replacement/upgrade program at a level that retains the value of our assets and assures a safe and reliable transmission system, with minimal rate impacts.

Because of the increase in rehabilitation projects, decrease in new construction projects, and reduced C&R program budget, it is increasingly difficult to plan specific projects years in advance. Discovery of a failing piece of equipment may completely change the planned priority of work. Customer needs and willingness to provide financing may also change, causing Western to revise or reprioritize planned construction projects. While this section incorporates Western's best efforts to identify and schedule necessary construction and rehabilitation projects, the increased focus on replacements and the realities of operating and maintaining a complex interconnected power system mean unforseen priority projects will surface from time to time. Western may have to slip or restructure planned projects to accommodate these sudden priority projects, but all projects will be replacements and upgrades of aging existing equipment necessary to maintain the reliability and integrity of Western's power transmission system. Western's policy will continue to assign the highest program priority to those situations which pose the highest risk to safety and system reliability.

Western's C&R program delays replacement costs for as long as reasonably possible while managing the risk of sudden failure and emergency replacement. Further postponement due to budget constraints will contribute to an overall degradation of Western's power facilities, leading to serious power system disruptions and lengthy power outages while crews repair or replace failed equipment under emergency conditions. "Breakdown maintenance" results in higher costs than scheduled replacements and increases safety risks to maintenance crews, as equipment failures are very often tied to extreme weather conditions and/or high system power loadings.

Personnel costs and related expenses such as compensation, travel for the workforce to plan, collect field data, write specifications, design facilities, award construction contracts, and purchase government-furnished equipment for the C&R activity are combined with those of the operation and maintenance activity and are reflected in the Program Direction section of Western's budget request.

Performance Measures

The C&R program supports the performance measures as presented under Program Mission.

- Replacement and upgrade of aged power system components is crucial to system reliability, and communications improvements maintain vital control over system operation. Both contribute to the Transmission System Performance measure.
- The C&R program also supports the Safety goal by reducing the hazards associated with worn or aging equipment, and by replacing deteriorated wood poles which present a serious climbing hazard to linemen. Public safety is supported by avoiding or minimizing the negative impacts of unplanned outages due to equipment failure.
- The activities under the C&R program indirectly support the Cost Growth and Repayment of Power Investment measures by minimizing capital investment and avoiding emergency "breakdown maintenance" costs, and preventing outages which could impact power deliveries and revenues.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Transmission Lines and Terminal Facilities ..	3,609	3,807	15,424	+11,617	+305.1%
Substations	12,389	7,130	5,454	-1,676	-23.5%
Other [a]	8,245	9,865	5,924	-3,941	-39.9%
Total, Construction & Rehabilitation	24,243	20,802	26,802	+6,000	+28.8%
Planned Use of Prior Year Balances	-15,525	-1,845	0	+1,845	+100.0%
Total, C&R Budget Authority	8,718	18,957	26,802	+7,845	+41.4%

[a] Other includes communication equipment (such as microwave, telecommunications, and supervisory control and data acquisition systems), maintenance facilities, power facility developmental costs, and minor unscheduled jobs.

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Transmission Lines and Terminal Facilities			
■ Complete minor modifications and rehabilitation of transmission lines (TL) in FY 2000 to ensure power system reliability and stability: ▸ Removal of 16.1-mile Blue River-Summit TL (Colorado) from a floodplain and scenic area; ▸ Rebuild 1.9 miles of Estes-Mary's Lake TL (Colorado) and make related improvements to Estes Switchyard. (Joint venture with Platte River Power Authority to increase reliability to City of Estes Park;) ▸ Wood pole life extension of Armour-Mt. Vernon 115-kV TL (South Dakota); ▸ Rebuild 4 short aging tap lines in Wyoming and add overhead ground wires to improve reliability; ▸ Construct Shiprock-Four Corners (New Mexico) approach spans as part of upgrade to 345-kV TL which will improve system capacity and reliability, provide a high-capacity interconnection with participants in the Four Corners powerplant project as well as other utilities, allow additional system operation flexibility including wheeling that cannot be presently accommodated. Joint venture with Tri-State Generation & Transmission Association and Arizona Public Service Company; ▸ Treat or replace wood poles that have failed inspection in the Colorado River Storage Project and Pick-Sloan Missouri Basin Program as a means of TL life extension. Funding level is determined by estimating the cost to complete each project, and breaking out these costs by fiscal year. The estimates are based on recent actual costs to complete similar projects, updated individual project requirements, and past experience. Any decrease in funding would delay completion of one or more of these active projects	3,609	3,807	4,102

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Several TL and terminal facility rehabilitation starts are planned in FY 2000: ▸ Replace jointly-owned 500-kV series capacitors at Round Mountain Substation (California). The capacitors are PCB-contaminated and can only be operated at 2/3 of their original rating due to age. The bypass switches are mechanically operated and prone to failure. Joint venture with Pacific Gas & Electric, who will perform the work. ▸ Reroute a 5-mile portion of Curecanti-Lost Canyon 230-kV TL (Colorado). Area has unstable soils and landslides which have moved and damaged existing structures. Project will reposition a portion of line to a location with more stable soils, decreasing the risk of outages and reducing maintenance costs. ▸ Rebuild Prospect Valley Tap-Prospect Valley Substation 115-kV TL (Colorado). This 7.3-mile line, constructed in 1944, has badly deteriorated wood poles. ▸ Replace pneumatic control and bypass systems for series capacitor banks at Mead Substation (Nevada) and Liberty Substation (Arizona). The existing controls have deteriorated and are not functioning well. Manufacturer's replacement parts are no longer available. Failure of the controls reduces capacity on the key Mead-Liberty 345-kV TL by 150 megawatts. ▸ Uprate the Big George-Carter Mountain TL (Wyoming). This line, constructed to 115-kV specifications, is operated at 69-kV. Project would upgrade the substation and tap equipment to allow 115-kV operation, reducing loads on other lines and improving system operations. Joint venture; Western's share is 50 percent. TL and terminal starts address specific system reliability risks or operational problems. Estimates are based on actual costs of recent similar projects, expected costs of equipment and services, cost estimating guides, and experience. Budget decreases will cause these starts to be delayed, impacting outyear planning. Delays increase the backlog of necessary work, increase the risk of equipment failure and system disruptions, and cause budget increases in future years. The work cannot be avoided indefinitely and must eventually be accomplished.	0	0	11,322

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Transmission line and terminal work for others in FY 2000 includes: ▸ Construction of the Black Mountain-Del Bac TL (Arizona) in the Central Arizona Project for the Bureau of Reclamation; ▸ Construction of a switching station and loop to allow direct interconnection to a Western TL for the City of Lodi (California); ▸ Construction of a switching station and loop to allow direct interconnection to a Western TL for the Calpine Project Sutter Powerplant (California); ▸ Relocate 4 miles of the Beaver Creek-Weld TL (Colorado) for the Colorado Highway Department; ▸ Continue to work with the Navajo Nation to develop a project that will increase the transfer capability across the Four Corners (New Mexico) area. Participation in this project will continue if funding is received from non-Western sources	0	0	0
Total, Transmission Lines and Terminal Facilities	3,609	3,807	15,424

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Substations			
■ Complete the replacement of high-voltage equipment such as circuit breakers, transformers, reactors, disconnect switches, and fuses at: Casa Grande 02, ED-4, Gila 06, Parker and Wellton-Mohawk (Arizona); Ault, Estes 03 and 04, and Prospect Valley (Colorado); Denison 08 (Iowa); Stegall (Nebraska); Custer 03, Miles City MC-4, Rudyard and Yellowtail (Montana); Bismarck and Washburn (North Dakota); Bonesteel, Huron 14, Rapid City, Summit 10, New Underwood and Winner (South Dakota); and Badwater 06 and Lovell 08 (Wyoming). This equipment requires replacement primarily due to reliability and age, safety concerns, and/or availability of spare parts. Oil containment is added when appropriate to protect nearby water resources from possible contamination. Complete demolition of Basic Substation (Arizona). Update computer-aided engineering equipment used for designing Western facilities. The funding level is determined by estimating the cost to complete each project, and breaking out these costs by fiscal year. The estimates are based on recent actual costs to complete similar projects, updated individual project requirements, and past experience. Any decrease in funding would delay completion of one or more of these active projects	9,959	7,130	3,211
■ Purchase and install equipment that would provide additional capability to correct low voltage problems that occur on the existing Parker-Davis transmission system along the Colorado River in northwestern Arizona	2,200	0	0
■ Replace the 37-year old transformer at Derby Hill (Colorado) and consolidate loads from Derby Hill and Loveland Substations at Derby Hill. Remove Loveland Substation to reduce maintenance costs. Joint venture with other entities in the area	230	0	0

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Substation rehabilitation starts planned in FY 2000 include: ▸ Replace the 115/69-kV transformer at Haxtun Substation (Colorado). The transformer, installed in 1954, requires excessive maintenance and is at risk of failure. Replacement will reduce annual maintenance expenses and support system reliability. ▸ Replace aging reactors at Grand Island Substation (Nebraska). Failure would cause unacceptable voltage levels which could damage other electrical equipment or precipitate an outage. Modification kits, installed when units were new, can no longer be maintained. ▸ Addition of line interrupters, upgrade of relaying and control equipment, and replacement of 1950's vintage control boards and control building at Beresford Substation (South Dakota). The interrupters will add protection and switching capability for the transformer and TL, and a remote terminal unit will allow for remote control and monitoring. Equipment is obsolete and spare parts are difficult to obtain. ▸ Replacement of 115/69-kV transformer and several smaller potential and circuit transformers at Brookings Substation (South Dakota). Transformers are near expected service life and pose a risk to system reliability. Spare parts are difficult to obtain. ▸ Replacement of main transformer, two disconnect switches, and control building, and addition of two line interrupters at Woonsocket Substation (South Dakota). Substation was built in 1954 and equipment has exceeded its service life expectancy. Building is deteriorated, placing the control equipment inside at risk. These substation starts address specific identified system reliability risks or operational problems. Estimates are based on actual costs of recent similar projects, including costs of equipment and services, data from specialized cost estimating guides, and organization experience. Any decrease in funding will cause one or more of these starts to be delayed, impacting outyear planning. Delays in planned construction projects increases the backlog of necessary work, increases the risk of equipment failure and system disruptions, and creates increases in future budget years. The work cannot be avoided through delay, and must be accomplished at some point in time	0	0	2,243

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Work for others includes construction of the Topock Substation (Arizona); Flanagan Substation for the City of Shasta Lake (California); and Flandreau Substation 08 for the City of Flandreau (South Dakota)	0	0	0
Total, Substations	12,389	7,130	5,454
Other			
■ Upgrade/replace/expand communication systems (supervisory control and data acquisition equipment, microwave, fiber optic and telecommunication) in the Central Valley Project and Pick-Sloan Missouri Basin Program to operate and control the transmission system. Replacement parts for the existing communications system are becoming very difficult to find and the increased use of remote control of facilities, coupled with the greater integration of the Federal system with the rest of the grid, and technological advances in the communications field, makes secure and reliable communications crucial to Western's mission. Rapid advances in communications technology, coupled with manufacturers' phase-out of support for existing systems, primarily drive the need for communications replacements and upgrades. Effective control of remote facilities is crucial to the operation of the power system; impacts from faulty communications can range from electric equipment damage to system-wide power flow problems, including black-outs. Funding level is determined by using recent actual costs, including equipment costs and construction contracts. Decreases to this line item will delay scheduled communications replacements, increase the possibility of communication system failures, and potentially contribute to system-wide power problems.	5,390	5,096	1,795

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Add fire protection at various maintenance facilities in the Western Division of the Pick-Sloan Missouri Basin Program, including the Virginia Smith Converter Station (Nebraska). Provide additional storage for housing vehicles, electrical equipment, and supplies that are presently being stored outside, subjected to adverse weather conditions at Western maintenance facilities at Phoenix (Arizona); Elverta and Keswick (California); Bismarck and Fargo (North Dakota); Huron, Armour, Pierre, Rapid City, and Watertown (South Dakota); and Casper (Wyoming). Provide a station service solar power source at Folsom (California) to reduce facility heating and cooling costs and support DOE renewable energy development goals. Of these, Bismarck, Phoenix, and Virginia Smith Converter Station fire protection are FY 2000 starts. The Bismarck Warehouse will replace old Quonset huts which have a history of flooding, and will allow indoor storage of maintenance vehicles and electrical equipment and materials presently left exposed to the elements. The Phoenix O&M Center project will remodel an existing 45-year-old building, eliminating safety problems and updating lighting, electrical, and fire and intrusion alarm systems to present code standards. The Virginia Smith Converter Station is a key facility in the interconnected electrical system, one of only four which tie the Western and Central transmission grids together. The project will provide a fire detection and suppression system at this important facility. Power facility developmental costs are included. Miscellaneous minor construction jobs, not normally scheduled or anticipated as part of larger projects, are included. The miscellaneous work is partially cosponsored. Each project cost is determined using the actual costs of recent similar projects, estimated quantities of needed materials, past contract costs, specialized cost estimating guides, and in-house experience. Power facility development costs are rigorously reviewed by Western's Maintenance, Design and Construction Council, and each activity is only included if anticipated benefits clearly outweigh the costs. Any decrease in funding will cause projects to be slipped to the outyears, adding to work backlog and forcing outyear budget requests to increase	2,855	4,769	4,129

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ The following projects will have active preconstruction activities during FY 2000: Gila-Knob TL Reconductor and Tucson Substation replacements (both in Arizona); Davis 69-kV Switchyard rebuild, Parker Dam transformer replacement, photovoltaic station service, and Sacramento Valley reliability reinforcements (all in California); Granby Pumping Plant Switchyard 02 additions and Wray Substation fuse replacement (both in Colorado); Creston Substation additions and replacements (Iowa); Glendive transformer replacement (Montana); Fargo Substation replacements and Forman Substation additions and replacements (both in North Dakota); Armour and Fort Thompson replacements, Groton Substation additions and replacements, and Philip breaker replacements (all in South Dakota); Medicine Bow and Laramie Tap rebuilds and Laramie-Cheyenne-Nunn 115-kV TL reconstruction (both in Wyoming); and transmission line life extension projects (various states). Funds for these activities are included in the Program Direction section of Western's request	0	0	0
Total, Other	8,245	9,865	5,924
Total, Construction and Rehabilitation	24,243	20,802	26,802

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Transmission Lines and Terminal Facilities	
■ The increase for Transmission Lines is primarily due to three factors:	
▸ the increasing need to reconstruct or perform life extension work on sections of aging wood pole transmission lines;	
▸ the unanticipated need to reroute a portion of the lattice steel Curecanti-Lost Canyon line due to soil instability; and	
▸ replacement of series capacitors or bypass systems at Mead, Liberty and Round Mountain substations	+11,617
Substations	

	FY 2000 vs. FY 1999 ($000)
■ The decrease in Substations is due to a shift of budgetary resources to necessary wood pole transmission rehabilitation, purchase of equipment in FYs 1998 and 1999 to be installed in FY 2000, fewer and smaller construction contract awards, and an increase in the use of in-house labor to install substation equipment	-1,676
Other	
■ The decrease in Other is due to a shift of budgetary resources to wood pole transmission line work, the completion of several microwave projects, and the completion of four maintenance facilities. These decreases are partially offset by three maintenance facility awards	-3,941
Total Funding Change, Construction and Rehabilitation	+6,000

Purchase Power and Wheeling

Mission Supporting Goals and Objectives

Beginning in FY 2000, Western Area Power Administration (Western) will no longer seek appropriations for the Purchase Power and Wheeling (PPW) activities. Instead, the customers of Western will make their own power purchases and transmission arrangements directly with suppliers. Lower electricity prices and improved transmission access that result from restructuring of the electricity industry allows most customers to continue obtaining these power purchases and wheeling services from other sources. Power receipts estimates have been reduced to reflect the reduced spending by Western.

The PPW program obtained electrical resources and transmission capability to firm up the Federal hydropower used to meet Western's contractual power delivery obligations. Transmission wheeling services were purchased when third-party transmission lines were needed to deliver Federal power to Western's customers.

Alternative financing methods which included net billing, bill crediting, Federal and non-Federal reimbursable, reduced the dollars appropriated from the Reclamation Fund for the PPW program by 50- to 60 percent annually. In FY 2000, Western's power customers are expected to finance both the previously appropriated and alternatively-financed firming energy and transmission wheeling requirements which we estimate at approximately $54 million of appropriations and $87 million of alternative financing for FY 2000.

Performance Measures

- The PPW program primarily supported the Repayment of Power Investment measure by providing a more valuable firm resource to market. The additional revenue derived aided in the timely repayment of the taxpayer investment in the projects' power facilities as well as full recovery of Western's and the generating agencies' annual costs allocated to power, including operation and maintenance, PPW, and interest to Treasury on unpaid project investment.
- The PPW program supported the Safety and Cost Growth measures by providing flexibility in meeting power delivery obligations while essential maintenance activity to either transmission or generation assets was underway, or while flood control flow regimes or other restrictions for public safety were in place.
- While not directly related to the Transmission System Performance measure, the PPW program increased the reliability of the energy marketed in spite of external constraints to the hydropower system brought about by changing reservoir conditions, inflows, and variable flow regimes designed to respond to irrigation, navigation, fish and wildlife, and recreation needs.

Funding Schedule

Two funding schedules follow. The first shows the budgeted program requirement, consisting of new budget authority and prior year balances, net of any alternative financing planned. The second illustrates the gross purchase power need including use of alternative financing methods.

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Central Valley Project	47,945	48,977	0	-48,977	-100.0%
Pick-Sloan Missouri Basin Program	6,941	4,909	0	-4,909	-100.0%
Total, PPW	54,886	53,886	0	-53,886	-100.0%
Use of Prior Year Balances, Net	-2,351	-170	0	+170	+100.0%
Total, PPW Budget Authority	52,535	53,716	0	-53,716	-100.0%
Program Activity (Gross)					
Central Valley Project	121,450	105,527	0	-105,527	-100.0%
Pick-Sloan Missouri Basin Program	42,150	44,347	0	-44,347	-100.0%
Total, PPW (gross)	163,600	149,874	0	-149,874	-100.0%
Use of Alternative Financing					
Net Billing, Bill Crediting, Non-Federal Reimbursable	-86,314	-75,988	0	+75,988	+100.0%
Reimbursable, Federal Contract Loads	-22,400	-20,000	0	+20,000	+100.0%
Subtotal, Alternative Financing	-108,714	-95,988	0	+95,988	+100.0%
Total, PPW	54,886	53,886	0	-53,886	-100.0%
Use of Prior Year Balances, Net	-2,351	-170	0	+170	+100.0%
Total, PPW Budget Authority	52,535	53,716	0	-53,716	-100.0%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Central Valley Project			
■ In FY 2000, Western will not seek appropriations for PPW. The customers are expected to provide for the energy, capacity, and wheeling services directly from suppliers (PG&E, PacifiCorp, and Enron). Existing long-term power purchase and power sale contractual commitments not funded by customers will be terminated or amended as necessary. Amounts enacted for FY 1998 and FY 1999 were based primarily on contractual pricing and delivery terms negotiated in the long-term firm purchase agreements and to a lesser extent on market estimates for non-firm purchases..	121,450	105,527	0
■ Alternative methods of financing, which offset the appropriation requirement, are eliminated in FY 2000 as Western's customers will provide for the PPW activities. FY 1998 and FY 1999 estimates were based on customer and supplier participation in the net billing, bill crediting, and reimbursable programs..	-73,505	-56,550	0
Total, Central Valley Project	47,945	48,977	0
Pick-Sloan Missouri Basin Program			
■ In FY 2000, Western will not seek appropriations for the power firming needs and delivery obligations of the Eastern and Western Divisions of the Pick-Sloan Missouri Basin Program, nor for the Fryingpan-Arkansas Project. Western's customers are expected to provide for the firming energy and wheeling arrangements. FY 1998 and FY 1999 amounts were based primarily on Corps of Engineers' firming resources estimates, market pricing of short-term firm energy, and negotiated transmission rates	42,150	44,347	0
■ Alternative methods of financing, which offset the appropriation requirement, are eliminated in FY 2000 as Western's customers will provide for the PPW activities. FY 1998 and FY 1999 estimates were based on customer and supplier participation in the net billing, bill crediting, and reimbursable programs	-35,209	-39,438	0
Total, Pick-Sloan Missouri Basin Program	6,941	4,909	0
Total, Purchase Power and Wheeling	54,886	53,886	0

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Central Valley Project	
■ In FY 2000, Western will not seek appropriations for PPW. The customers of the CVP are expected to provide for the energy, capacity, and wheeling services directly from suppliers. Existing long-term power purchase and power sale contractual commitments not funded by customers will be terminated or amended as necessary	-48,977
Pick-Sloan Missouri Basin Program	
■ In FY 2000, Western will not seek appropriations for PPW. The customers of the Pick-Sloan Missouri Basin Program and the Fryingpan-Arkansas Project are expected to provide for the energy, capacity, and wheeling services directly from suppliers. Existing long-term power purchase and power sale contractual commitments not funded by customers will be terminated or amended as necessary	-4,909
Total Funding Change, Purchase Power and Wheeling	-53,886

Utah Mitigation and Conservation

Mission Support Goals and Objectives

The Reclamation Projects Authorization and Adjustment Act of 1992, Title IV, established the Utah Reclamation Mitigation and Conservation Account (Account) in the Treasury of the United States. The purpose of this Account is to ensure that the level of environmental protection, mitigation, and enhancement achieved in connection with projects identified in the Act and elsewhere in the Colorado River Storage Project in the State of Utah is preserved and maintained. The Administrator of Western Area Power Administration (Western) is authorized to deposit funds into the Account. Such expenditures are to be considered nonreimbursable and nonreturnable. The Utah Reclamation Mitigation and Conservation Commission, established under Title III of the Act, is authorized to administer all funds deposited into the Account.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Total, Utah Mitigation and Conservation Budget Authority	5,592	5,036	5,036	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Utah Mitigation and Conservation			
■ Deposit into Utah Reclamation Mitigation and Conservation account, as authorized by Public Law 102-575	5,592	5,036	5,036
Total, Utah Mitigation and Conservation	5,592	5,036	5,036

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Utah Mitigation and Conservation	
■ The request reflects a constant funding level.	0
Total Funding Change, Utah Mitigation and Conservation	0

Boulder Canyon Project

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Boulder Canyon Project					
Program Direction	0	0	0	0	3,673
Equipment, Contracts and Related Expenses	0	0	0	0	498
Total, Boulder Canyon Project	0	0	0	0	4,171
Permanent Appropriation, CRDF	0	0	0	0	-4,171
Total, Boulder Canyon Permanent Budget Authority	0	0	0	0	0

Public Law Authorizations:

Public Law 70-642, "Boulder Canyon Project Act" (1928)
Public Law 75-756, "Boulder Canyon Project Adjustment Act" (1940)
Public Law 95-91, "Department of Energy Organization Act" (1977)
Public Law 98-381, "Hoover Power Plant Act of 1984"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Western Area Power Administration	0	0	4,171	+4,171	N/A
Permanent Appropriation, CRDF	0	0	-4,171	-4,171	N/A
Total, Boulder Canyon Project	0	0	0	0	N/A

Site Description

Hoover Dam, the highest and third largest concrete dam in the United States, sits on the Colorado River along the Arizona-Nevada border. Lake Mead, the reservoir formed behind Hoover Dam, is still the nation's largest manmade reservoir. The reservoir can hold a two-year supply of average flow of the Colorado River with its storage capacity of 27.38 million acre-feet.

This enormous project began with 1928 legislation approving construction of the Boulder Canyon Project. Hoover Powerplant has 19 generating units and an installed capacity of 2,064,000 kilowatts. High-voltage transmission lines and substations make it possible for people from Las Vegas (Nevada), Phoenix (Arizona) and Los Angeles (California) to receive power from the project.

Since the start of commercial power generation in 1938, Hoover, with yearly average generation of 4.5 billion kilowatthours, has served the annual electrical needs of nearly 8 million people. This power is marketed under the Hoover Power Plant Act of 1984 and the 1984 Conformed General Consolidated Power Marketing Criteria or Regulations for Boulder City Area Projects. Western Area Power Administration markets and transmits Boulder Canyon power, and operates and maintains its transmission facilities.

Boulder Canyon Project Program Direction

Mission Supporting Goals and Objectives

The Boulder Canyon Project (Project) consists primarily of Hoover Dam, its powerplant, and the associated substations and transmission facilities. Revenues from the sale of Project electric energy and capacity are deposited in the Colorado River Dam Fund (CRDF), administered by the Department of Interior, and are available without further appropriation. Beginning in FY 2000, Western Area Power Administration (Western) will pay for Boulder Canyon Project operations directly from the CRDF. Previously, this Project was included in Western's Construction, Rehabilitation, Operation and Maintenance (CROM) account, and funds were provided from the CRDF by transfer. FY 1999 expenses will be covered by transfer of previously authorized funding from the CRDF. Revenues that are collected in excess of expenses are used for repayment of investments to the U.S. Treasury.

Western operates and maintains the transmission system for the Project to ensure an adequate supply of reliable electric power in a clean and environmentally-safe, cost-effective manner. Western achieves continuity of service by maintaining its power systems at or above industry standards, rapidly restoring service following any system disturbance, mitigating adverse environmental impacts, performing clean-up activities, and maximizing revenues gained from non-firm energy sales. In concert with our customers, Western reviews required replacements to its existing infrastructure to sustain reliable power delivery to our customers and to contain annual maintenance expenses.

Performance Measures

The Program Direction activities of the Project support the performance measures presented under Program Mission.

- Highly-skilled staff respond to minute-by-minute load changes to meet or exceed North American Electric Reliability Council and industry averages for Transmission System Performance. Craftsmen maintain or replace equipment to assure its capability for reliable delivery of power. The crews also rapidly restore the system following any disturbance.
- Program Direction activities support Western's Safety measurement by making safety a priority in each and every task because of the extreme hazards associated with a high-voltage electrical system. Safety is not a separate program but is integrated into all procedures and jobs.
- The Cost Growth measurement is a direct reflection of Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system, including the associated Program Direction activities, while not compromising the reliability of power deliveries. Controlling costs is vital to the continuing health of our organization as we move into an era of increased competition. High costs contribute to higher rates, reducing our competitive position and that of our customers.

- Program Direction activities support the Repayment of Power Investment measurement by providing 24-hour reliable electric power delivery to our customers.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salary & Benefits	0	0	1,965	+1,965	N/A
Travel	0	0	140	+140	N/A
Support Services	0	0	286	+286	N/A
Other Related Expenses	0	0	1,282	+1,282	N/A
Total, Program Direction	0	0	3,673	+3,673	N/A
Permanent Appropriation, CRDF	0	0	-3,673	-3,673	N/A
Total, Program Direction Permanent Budget Authority	0	0	0	0	N/A
Full-Time Equivalents (FTE)	0	0	26	+26	N/A

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salary & Benefits			
Salaries and benefits for 26 Federal employees to operate and maintain, on a continuing basis, the Project's high-voltage transmission facilities, including approximately 58 miles of high-voltage transmission lines, four substations and associated switchyards, communication, control and general plant facilities associated with this Project. Staff provide continuing services such as system operations and load dispatching, power billing and collection, power marketing, general power resources planning, energy services, technology transfer, environmental, safety, security and emergency management activities. Based on historical data, a 3 percent inflation factor has been applied	0	0	1,965

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Travel			
Transportation and per diem allowance for day-to-day performance of duties of Federal staff, including crews who maintain the Project transmission facilities. Also includes transportation of things. Estimates are based on historical travel costs, adjusted for inflation and planned activity, to reliably maintain the transmission system	0	0	140
Support Services			
Support services including automated data processing, warehousing, computer-aided drafting/engineering, and general administrative support. The request is based on exercising the one-year option for the current level of contract support.	0	0	286
Other Related Expenses			
Other related expenses including but not limited to, rental space, utilities and miscellaneous charges, printing and reproduction, training tuition fees, maintenance and repair of office equipment, supplies and materials, personal computers, telecommunications, multi-project costs, and distribution of Western's general management costs. Rental space costs assume the GSA-inflation factor, adjusted by the number of employees funded in this Account. Acquisitions of software and personal computers to more fully implement Western's financial system which utilizes individual user input are included. Other costs are based on historical usage and actual cost of similar items	0	0	1,282
Total, Program Direction	0	0	3,673

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Program Direction	
■ This request does not reflect any new initiatives, but rather provides detailed information for the Project which will now be funded directly from CRDF receipts. Previously, all items were included with Western's CROM account, and were funded by transfer of budget authority from the CRDF. When comparing this request with FY 1999 amounts included for the Program Direction activities of the Project in Western's CROM account, this request is a decrease of $202,000. The decrease is primarily attributed to four fewer FTE scheduled to work on this Project.	+3,673
Total Funding Change, Program Direction	+3,673

Support Services

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Economic and Environmental Analysis	0	0	0	0	N/A
Test and Evaluation Studies	0	0	0	0	N/A
Total, Technical Support Services	0	0	0	0	N/A
Management Support Services					
Management Studies	0	0	4	+4	N/A
Training and Education	0	0	2	+2	N/A
ADP Support	0	0	116	+116	N/A
Administrative Support Services	0	0	164	+164	N/A
Total, Management Support Services	0	0	286	+286	N/A
Total, Support Services	0	0	286	+286	N/A

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	0	0	37	+37	N/A
Working Capital Fund	0	0	9	+9	N/A
Printing and Reproduction	0	0	3	+3	N/A
Rental Space	0	0	70	+70	N/A
Software Procurement/Maintenance Activities/Capital Acquisitions	0	0	113	+113	N/A
Other	0	0	1,050	+1,050	N/A
Total, Other Related Expenses	0	0	1,282	+1,282	N/A

Equipment, Contracts and Related Expenses

Mission Supporting Goals and Objectives

The Boulder Canyon Project (Project) is comprised of power marketing, operation, and maintenance of transmission facilities, located primarily in Nevada. Beginning in FY 2000, these activities are paid for through direct access to the Colorado River Dam Fund (CRDF) revenues. Previously, this Project was included in Western Area Power Administration's (Western) Construction, Rehabilitation, Operation and Maintenance (CROM) account, and funds were provided from the CRDF by transfer.

Western operates and maintains the transmission system for the Project to ensure an adequate supply of reliable electric power in a clean and environmentally-safe, cost-effective manner. Western achieves continuity of service by maintaining its power systems at or above industry standards, rapidly restoring service following any system disturbances, mitigating adverse environmental impacts, and performing clean-up activities. In concert with our customers, Western reviews required replacements to its existing infrastructure to sustain reliable power delivery to our customers and to contain annual maintenance expenses.

Supplies and materials, such as wood poles, instrument transformers, meters and relays, must be procured to provide necessary resources to respond to routine and emergency situations in the Project's transmission facilities. Technical services, such as waste management disposal, environmental impact analyses, and pest and weed control, are utilized as needed.

Performance Measures

The Equipment, Contracts and Related Expenses activity of the Project supports the performance measures presented under Program Mission.

- Well-maintained equipment, the availability of resources to rapidly restore service following any system disturbances, and the ability of staff to respond to minute-by-minute changes in load requirements are all directly tied to the Transmission System Performance measure.
- This activity also supports the Safety measurement. Each maintenance activity begins with a discussion of safe-working procedures. Additionally, safety of the public and Western's personnel is one of the factors considered when replacing equipment.
- The Cost Growth measurement is a direct reflection of Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system while not compromising the reliability of power deliveries. Controlling costs is vital to the continuing health of our organization as we move into an era of increased competition. High costs contribute to higher rates, reducing our competitive position.
- The Repayment of Power Investment measurement is supported by providing 24-hour/day reliable electric power delivery to our customers, thus enhancing revenues and repayment of Project expenses and investment.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Equipment, Contracts and Related Expenses	0	0	498	+498	N/A
Permanent Appropriation, CRDF	0	0	-498	-498	N/A
Total, Equipment, Contracts and Related Expenses Permanent Budget Authority	0	0	0	0	N/A

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Equipment, Contracts and Related Expenses			
■ Supplies and materials necessary to respond to routine and emergency situations in the Project's high-voltage transmission facilities. The request is based on projected workplans for activities and historical data of actual supplies needed to maintain the transmission system reliably. Costs are based on recent procurements of similar items.	0	0	498
Total, Equipment, Contracts and Related Expenses	0	0	498

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Equipment, Contracts and Related Expenses	
■ This request does not reflect a new initiative, but rather provides specific information for the Project activity which, beginning in FY 2000, will be funded directly from receipts to the CRDF, administered by the Department of Interior. Previously, all items in this activity were included with Western's CROM account request and were funded by transfer of budget authority from the CRDF. When compared to the amount requested in FY 1999 for the Project's equipment, contracts and related expenses (included in Western's CROM request), the request is an increase of $40,000, primarily attributed to pro-rational costs associated with the rehabilitation of an existing warehouse (built in 1952) to bring it within current fire and safety standards	+498
Total Funding Change, Equipment, Contracts and Related Expenses	+498

FY 2000 COMPARABILITY MATRIX

FY 1998 Current Appropriation

(Dollars in Thousands)

NEW STRUCTURE

	FY 2000 CB REQUEST STRUCTURE	CROM Program Direction	CROM O&M	CROM C&R	CROM PP&W	CROM Utah	Bldr.Can. Program Direction	Bldr.Can. Equip & Contracts	Total
FY 1998 CURRENT STRUCTURE	Program Direction	$106,157					$2,174		$108,331
	O&M		$39,246					$500	$39,746
	C&R			$24,243					$24,243
	PP&W				$54,886				$54,886
	Utah					$5,592			$5,592
	Total Program	$106,157	$39,246	$24,243	$54,886	$5,592	$2,174	$500	$232,798
	Use of PY Balances	-23,205	0	-15,525	-2,351	0	0	0	-41,081
	Total BA	$82,952	$39,246	$8,718	$52,535	$5,592	$2,174	$500	$191,717

FY 2000 COMPARABILITY MATRIX

FY 1999 Current Appropriation

(Dollars in Thousands)

NEW STRUCTURE

	FY 2000 CB REQUEST STRUCTURE	CROM Program Direction	CROM O&M	CROM C&R	CROM PP&W	CROM Utah	Bldr.Can. Program Direction	Bldr.Can. Equip & Contracts	Total
FY 1999 CURRENT STRUCTURE	Program Direction	$103,508					$3,875		$107,383
	O&M		$36,011					$458	$36,469
	C&R			$20,802					$20,802
	PP&W				$53,886				$53,886
	Utah					$5,036			$5,036
	Total Program	$103,508	$36,011	$20,802	$53,886	$5,036	$3,875	$458	$223,576
	Use of PY Balances	-11,870	-2,358	-1,845	-170	0	-3,875	-458	-20,576
	Total BA	$91,638	$33,653	$18,957	$53,716	$5,036	$0	$0	$203,000

Falcon and Amistad Maintenance Fund

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Falcon and Amistad Operating and Maintenance Expenses	970	1,010	0	1,010	1,309
Total, Falcon And Amistad Budget Authority	970	1,010	0	1,010	1,309

Public Law Authorization:

Public Law 103-236, "Foreign Relations Authorization Act, Fiscal Years 1994 and 1995"

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Western Area Power Administration	970	1,010	1,309	+299	+29.6%
Total, Falcon and Amistad Maintenance Fund	970	1,010	1,309	+299	+29.6%

Site Description

Falcon-Amistad Project consists of two international storage projects located on the Rio Grande River between Texas and Mexico. The United States and Mexico share and operate separate powerplants on each side of the Rio Grande River. The power output is divided evenly between the two nations. The State Department's International Boundary and Water Commission (IBWC) operates the U.S. portion of the projects.

Falcon Dam is located about 130 miles upstream from Brownsville, Texas. The United States' portion of construction, operation and maintenance was authorized by Congress in 1950. Construction was started in that year and completed in 1954. The United States' share of Falcon Powerplant capacity is 31,500 kilowatts. The powerplant came on line in 1954.

Amistad Dam is located about 300 miles upstream from Falcon Dam. The Amistad Powerplant was constructed by the U.S. Army Corps of Engineers, as agent for the IBWC. The United States' portion of construction, operation and maintenance was authorized by the Mexican-American Treaty Act of 1950. Amistad powerplant, completed in 1969, has a generation capacity of 66,000 kilowatts. Its two generating units came on line in 1983.

Project power is marketed to two cooperatives in south Texas via Central Power and Light Company's transmission system.

Repayment is made through annual installments. These installments are established in advance by Western Area Power Administration (Western) and the customers on or before August 31 of the year preceding the appropriate fiscal year. Each annual installment pays the amortized portion of the U.S. investment in the Falcon and Amistad hydroelectric facilities with interest, and associated operation, maintenance and administrative costs. This repayment schedule does not depend upon the amount of power and energy delivered or the amount of generation each year.

Mission Supporting Goals and Objectives

The Falcon and Amistad Operating and Maintenance Fund (Maintenance Fund) was established in the Treasury of the United States as directed by the Foreign Relations Authorization Act, Fiscal Years 1994 and 1995. The Maintenance Fund is administered by the Administrator of Western for use by the Commissioner of the U. S. Section of the IBWC to defray operation, maintenance (O&M) and emergency costs for the hydroelectric facilities at the Falcon and Amistad Dams.

The Falcon/Amistad Dams hydroelectric power generation plants sell generated power to public utilities through Western. The two powerplants have a combined generating capacity of 97.5 megawatts.

All revenues collected in connection with the disposition of electric power generated at the Falcon and Amistad Dams, except monies received from the Government of Mexico, are credited to the Maintenance Fund. Revenues collected in excess of expenses are used to repay, with interest, the cost of replacements and original investments.

Funding will support 24-hour operation and maintenance of the two powerplants to ensure response to ever-changing water conditions, customer demand, and continual coordination with operating personnel of the Government of Mexico. In addition, power will be marketed, repayment studies will be completed, and revenues collected. The Federal staff funded under this program continue to be allocated to the U. S. Section of IBWC by the Department of State.

Performance Measures

The Falcon and Amistad Maintenance program supports the Performance Measures as presented under Program Mission.

- The Falcon and Amistad Maintenance programs supports the Cost Growth measure by optimizing economical O&M of the hydroelectric facilities while not compromising the reliability of power deliveries.
- The program also supports the Repayment of Power Investment measure by providing 24-hour/day reliable electric power delivery to the customers, ensuring planned principal payments to the Treasury.

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Funding Schedule

	(dollars in thousands)				
	FY 1998	FY 1999	FY 2000	$ Change	% Change
Falcon and Amistad Maintenance Fund	970	1,010	1,309	+299	+29.6%
Total, Falcon and Amistad	970	1,010	1,309	+299	+29.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Falcon and Amistad Maintenance Fund			
■ Operation and maintenance of the two powerplants on a 24-hour/day basis, including planned maintenance activities and required safety services. Twenty-one employees of the U.S. Section of the IBWC are funded in this Activity	970	1,010	1,309
Total, Falcon and Amistad	970	1,010	1,309

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Falcon and Amistad Maintenance Fund	
■ The increased funding is necessary primarily for equipment purchases, upgrades and replacements ($147,000) which have been delayed due to funding restrictions, and salary/benefit increases for staff ($92,000). The equipment, which has outlived its usefulness and is essential for operation, includes:	
▸ Control room recorders at the Falcon Powerplant which are no longer reliable;	
▸ Station service batteries which are 18-years old;	
▸ AC-DC inverters, installed in 1982; and	
▸ Fifteen-year old heating/ventilating/air conditioning equipment at the Amistad Powerplant which is essential to the operation of electronic components.	
Essential services to meet safety requirements (i.e., motor rewinding, crane services for bulkhead setting, CO2 system and elevator servicing) increase $39,000. The balance of the increase ($21,000) is for OSHA training and associated travel, and miscellaneous transportation, communication and utility expenses	+299
Total Funding Change, Falcon and Amistad Maintenance Fund	+299

Colorado River Basins Power Marketing Fund

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Colorado River Basins Power Marketing Fund					
Program Direction	25,526	26,478	0	26,478	29,298
Equipment, Contracts and Related Expenses	99,260	74,183	0	74,183	84,293
Total, Operating Expenses	124,786	100,661	0	100,661	113,591
Offsetting Collections Realized	-140,884	-116,759	0	-116,759	-134,591
Total, Obligational Authority	-16,098	-16,098	0	-16,098	-21,000

Public Law Authorizations:

Public Law 75-529, "The Fort Peck Project Act of 1938"
Public Law 84-484, "The Colorado River Storage Project Act of 1956"
Public Law 90-537, "The Colorado River Basin Project Act of 1968"
Public Law 95-91, "Department of Energy Organization Act" (1977)

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Western Area Power Administration	124,786	100,661	113,591	+12,930	+12.8%
Offsetting Collections Realized	-140,884	-116,759	-134,591	-17,832	-15.3%
Total, Colorado River Basins Power Marketing Fund	-16,098	-16,098	-21,000	-4,902	-30.5%

Site Description

The Colorado River Basins Program is comprised of three power systems: the Colorado River Storage Project, including the Dolores and Seedskadee Projects; the Fort Peck Project; and the Colorado River Basin Project, including the Central Arizona Project. Western Area Power Administration is responsible for construction, maintenance, and operation of facilities for transmitting and marketing the electrical energy generated in these power systems. A brief description of each follows.

The **Colorado River Storage Project** (CRSP) was authorized in 1956. It consists of four major storage units: Glen Canyon, on the Colorado River in Arizona near the Utah border; Flaming Gorge on the Green River in Utah near the Wyoming border; Navajo on the San Juan River in northwestern New Mexico near the Colorado border; and the Wayne N. Aspinall unit on the Gunnison River in west-central Colorado.

CRSP has a combined storage capacity which exceeds 33.5 million acre-feet. Six Federal powerplants associated with the project, with 17 generating units, have a maximum operating capacity of 1,802,200 kilowatts. CRSP provides for the electrical needs of more than a million people spread across Colorado, Utah, New Mexico and Arizona. Portions of southern California, Nevada and Wyoming are also served by CRSP power.

The **Dolores Project**, located in Montezuma and Dolores counties in southwestern Colorado, and the **Seedskadee Project**, located in southwestern Wyoming, were authorized as participating projects of CRSP. Dolores, a multipurpose project, provides 12.8 megawatts of installed power generating capacity along with municipal and industrial water, irrigation water, and recreation and fish and wildlife enhancement. The Dolores Project powerplants at McPhee Dam and the Towaoc Canal produce 1,283 and 11,495 kilowatts, respectively. Seedskadee's power facilities, associated with the project's Fontenelle Dam, include an 11.5-megawatt powerplant, switchyard and necessary transmission lines to interconnect with the CRSP transmission system at Flaming Gorge Powerplant.

The **Central Arizona Project** (CAP), one of three related water development projects that make up the Colorado River Basin Project, was authorized to furnish irrigation and municipal water supplies to Arizona and New Mexico, and for other purposes. The Navajo Generating Station, located near Lake Powell at Page, Arizona, has three coal-fired steam electric generating units for a combined capacity of 2.25 million kilowatts. The Federal share of the capacity (24.3 percent) is used to power the pumps that move Colorado River water through CAP canals. Surplus generation is marketed.

The **Fort Peck Project**, located on the Missouri River in northeastern Montana, was begun under an Executive Order in October 1933 as part of the Public Works Administration. The Fort Peck Project Act of 1938 authorized the completion, maintenance and operation of the project, and the Flood Control Act of 1944 authorized integration of operation of the project with the Pick-Sloan Missouri Basin Program to serve a common market area. Installed generating capacity of the 5 units is 218 megawatts which is delivered primarily to customers in eastern Montana and western North Dakota.

Colorado River Basins Power Marketing Fund
Program Direction

Mission Supporting Goals and Objectives

The Colorado River Basins Program (Program) is comprised of the three power systems described earlier. This program is funded through Western Area Power Administration's (Western) business-type revolving fund (Federal Enterprise Fund), the Colorado River Basins Power Marketing Fund.

Revenues from the sale of electric energy and capacity replenish the fund and are available for expenditure for operation, maintenance, power billing and collection, program direction, purchase power and wheeling, interest, emergencies, and other power marketing expenses. Power sales and other revenues, which are collected in excess of expenses, are used for repayment of investments to the U.S. Treasury. This request is for spending authority only, and represents Western's estimate of obligations to finance these business-type operations.

Western operates and maintains the transmission system for the Projects funded in this account to ensure an adequate supply of reliable electric power in a clean and environmentally-safe, cost-effective manner. Western achieves continuity of service by maintaining its power systems at or above industry standards, rapidly restoring service following any system disturbances, mitigating adverse environmental impacts, performing clean-up activities, and maximizing the revenues gained from non-firm energy sales. In concert with our customers, Western reviews required replacements to its existing infrastructure to sustain reliable power delivery to our customers and to contain annual maintenance expenses.

Performance Measures

The Program Direction activities support the performance measures presented under Program Mission.

- Highly-skilled staff respond to minute-by-minute load changes to meet or exceed North American Electric Reliability Council industry averages for Transmission System Performance. Craftsmen maintain or replace equipment to assure its capability for reliable delivery of power. The crews also rapidly restore the system following any disturbance.
- Program Direction activities support Western's Safety measurement by making safety a priority in each and every task because of the extreme hazards associated with a high-voltage electrical system. Safety is not a separate program but is integrated into all procedures and jobs.
- The Cost Growth measurement is a direct reflection of Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system, including associated Program Direction activities, while not compromising the reliability of power deliveries. Controlling costs is vital to the continuing health of our organization as we move into an era of increased competition. High costs contribute to higher rates, reducing our competitive position.

- Program Direction activities support the Repayment of Power Investment measurement by providing 24-hour/day reliable electrical power delivery to our customers and maximizing revenues from non-firm power sales.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Salary & Benefits	13,108	13,501	16,260	+2,759	+20.4%
Travel	1,135	1,182	1,388	+206	+17.4%
Support Services	1,780	1,647	2,138	+491	+29.8%
Other Related Expenses	9,503	10,148	9,512	-636	-6.3%
Total, Program Direction	25,526	26,478	29,298	+2,820	+10.7%
Full-Time Equivalents (FTE)	183	161	189	+28	+17.4%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Salary and Benefits			
Salaries and benefits for 189 Federal employees that operate and maintain Western's high-voltage transmission system and associated facilities, and those that plan, design, and supervise the replacements and upgrades (capital investments) to the transmission facilities. Dispatchers and craftsmen operate and maintain the Program's high-voltage integrated transmission system comprised of approximately 4,000 circuit miles of transmission lines and associated substations, switchyards, communication, control, and general plant facilities. Staff provide continuing services such as system operations, power billing and collection, power marketing, energy services, technology transfer, environmental, safety, security and emergency management activities. Additionally, a portion of costs associated with 24-hour-a-day operation of power dispatching and security centers is included. Based on historical data, a 3% inflation factor has been applied	13,108	13,501	16,260

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Travel			
Transportation and per diem allowance for day-to-day performance of duties of Federal staff, including crews who maintain the transmission facilities. Also includes transportation of things. Estimates are based on historical travel costs, adjusted for anticipated escalation of airline fares, and planned activity ...	1,135	1,182	1,388
Support Services			
Support services including automated data processing, warehousing, computer-aided drafting/engineering, and general administrative support. The request is based on exercising the one-year option for the current level of contract support. The increase is for computer-aided drafting and engineering support which was inadvertently included previously in the Equipment, Contracts and Related Expenses request	1,780	1,647	2,138
Other			
Other related expenses, including but not limited to, space, utilities and miscellaneous charges, printing and reproduction, training tuition fees, maintenance of office equipment, supplies and materials, telecommunications, personal computers, multi-project costs, distribution of Western's general management costs and a portion of the costs received from National Archive and Records Administration (NARA). Rental space costs assume the GSA-inflation factor, adjusted by the number of employees funded in this Account. Other costs are based on historical usage and actual costs of similar items	9,503	10,148	9,512
Total, Program Direction	25,526	26,478	29,298

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Salary and Benefits	
■ Increase in salaries and benefits reflects an increase of 28 FTE for accomplishment of planned activities funded in this activity. The workplans for Western's workforce is prioritized based on criticality and crosses all funding accounts. Therefore, fluctuations in number of FTE required to perform the work in any given account may occur from year to year. Anticipated inflationary increases of 3 percent are also included.	+2,759
Travel	
■ Increase in travel is attributed to additional FTE working on activities for projects within this Fund	+206
Support Services	
■ Increases in support services is because in FY 1999 some costs were inadvertently excluded from the Program Direction request. In FY 2000 all support service contract costs have been identified and included as directed by Congress	+491
Other	
■ Decrease in other related expenses is primarily attributed to a decrease in replacements/upgrades of personal computers, offset by slight increases in space rent (which is prorated based on FTE), and distribution of charges from NARA	-636
Total Funding Change, Program Direction	+2,820

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Technical Support Services					
Economic and Environmental Analysis	0	0	0	0	N/A
Test and Evaluation Studies	0	0	0	0	N/A
Total, Technical Support Services	0	0	0	0	N/A
Management Support Services					
Management Studies	41	73	35	-38	-52.1%
Training and Education	15	19	20	+1	+5.3%
ADP Support	639	525	1,053	+528	+100.6%
Administrative Support Services	1,085	1,030	1,030	0	0.0%
Total, Management Support Services	1,780	1,647	2,138	+491	+29.8%
Total, Support Services	1,780	1,647	2,138	+491	+29.8%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Training	130	135	126	-9	-6.7%
Working Capital Fund	56	61	61	0	0.0%
Printing and Reproduction	10	11	11	0	0.0%
Rental Space	411	423	510	+87	+20.6%
Software Procurement/Maintenance Activities/Capital Acquisitions	1,234	1,469	786	-683	-46.5%
Other	7,662	8,049	8,018	-31	-0.4%
Total, Other Related Expenses	9,503	10,148	9,512	-636	-6.3%

Equipment, Contracts and Related Expenses

Mission Supporting Goals and Objectives

Western Area Power Administration's (Western) operation and maintenance activity supports the Department of Energy's Strategic Plan to promote secure, competitive, and environmentally-responsible energy systems that serve the needs of the public. Western ensures an adequate supply of reliable electric power in a safe, cost-effective manner, and achieves continuity of service throughout its service territory by maintaining its power system at or above industry standards, rapidly restoring service following any system disturbance, mitigating adverse environmental impacts, performing clean-up activities, and maximizing the revenues gained from ancillary services and non-firm energy sales.

The Colorado River Basins Program is comprised of power marketing, operation, and maintenance of transmission facilities of three power systems described in the Site Description section earlier. These activities are funded in Western's business-type revolving fund (Federal Enterprise Fund), the Colorado River Basins Power Marketing Fund.

Revenues from the sale of electric energy and capacity replenish the fund and are available for expenditure for operation, maintenance, power billing and collection, program direction, purchase power and wheeling, interest, emergencies, and other power marketing expenses.

Supplies and materials, such as wood poles, instrument transformers, meters and relays, must be procured to provide necessary resources to respond to routine and emergency situations in the high-voltage interconnected transmission system. Technical services, such as waste management disposal, environmental impact analyses, and pest and weed control, are utilized as needed.

Western's planned replacement and addition activity is based on an assessment of age and the maintenance frequency/problems of individual items of equipment, availability of replacement parts, safety of the public and Western's personnel, environmental concerns, and an orderly workplan. The workplans, coordinated with Western's power customers who ultimately bear the burden of all Western expenses, reflect an overall sustainable level of effort, with shifts in emphasis between categories (i.e. electrical versus communication equipment) in any given year.

Electrical equipment replacements, such as circuit breakers, transformers, insulators, revenue meters, switches, control boards, relays and oscillographs must be acquired to assure reliable service to Western's customers. System age and environmental concerns necessitate orderly replacement before significant problems develop.

Replacement and upgrade of microwave, supervisory control and data acquisition, and other communication and control equipment continues to provide increased system reliability, and reduce maintenance and equipment costs.

Capitalized movable equipment such as special purpose vehicles (e.g., cranes, auger trucks, manlifts), special purpose equipment (e.g., pole trailers, industrial tractors, brush chippers), specialized test equipment (e.g., motion analyzers and ductor tester equipment), computer-aided engineering equipment, office equipment, ADP equipment and software must be upgraded and replaced.

Electrical resources and transmission capability to firm up the Federal hydropower supplies needed to meet Western's contractual obligations will continue to be obtained. Transmission wheeling services are also purchased when a third party's transmission lines are needed to deliver Federal power to Western's customers.

Reimbursements to the U.S. Army Corps of Engineers for operation and maintenance of the Fort Peck Powerplant and planned interest payments to the U.S. Treasury are also included in this section.

Performance Measures

The Equipment, Contracts and Related Expenses activity supports the performance measures presented under Program Mission.

- Well-maintained equipment, the availability of resources to rapidly restore service following any system disturbances, and the ability of staff to respond to minute-by-minute changes in load requirements are all directly tied to the Transmission System Performance measure. Timely replacement of old or failing electrical equipment prevents sudden failure, unplanned outages, and possible regional power system disturbances.
- This activity also supports the Safety measurement by placing safety first in all of its day-to-day operations, removing environmental hazards, and replacing equipment that may create a safety hazard for the public and Western's personnel. Each maintenance activity begins with a discussion of safe-working procedures. This activity also indirectly supports public safety by minimizing or preventing electrical outages and the attendant safety risks and concerns.
- Western's commitment to optimize economical operation and maintenance of the interconnected high-voltage power system while not compromising the reliability of power deliveries directly supports the Cost Growth performance measure. A successful operation and maintenance program also reduces costs to Western's customers and the consumer by maintaining a high level of system reliability.
- The Repayment of Power Investment measure is supported by providing 24-hour/day highly reliable electrical power deliveries to our customers, thus enhancing revenues and repayment.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Equipment, Contracts and Related Expenses	99,260	74,183	84,293	+10,110	+13.6%
Total, Equipment, Contracts and Related Expenses	99,260	74,183	84,293	+10,110	+13.6%

Detailed Program Justification

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Equipment, Contracts and Related Expenses			
■ Supplies and materials necessary to respond to routine and emergency situations in the high-voltage interconnected transmission system, and reimbursements to the Corps of Engineers for operation and maintenance of the Fort Peck Powerplant. The request is based on projected workplans for activities funded from this account. Estimates are based on historical data of actual supplies needed to maintain the transmission system reliably, including emergency situations such as ice storms and tornadoes. Costs are based on recent procurement of similar items.	8,342	8,629	8,439
■ Electrical resources, transmission capability and wheeling services will be purchased. Western recently amended the Salt Lake City Area Integrated Projects Firm Electric Service Contract which implements the decision in the Electric Power Marketing Environmental Impact Statement to return customers' power allocations to those established in the Post-89 Marketing Plan. The action increases Western's firm annual contract commitments and is reflected in the FY 2000 request. Additionally, Western, at the direction of Congress, has developed procedures to obtain energy to offset lost generation	50,400	24,600	50,000
■ Capitalized equipment will be acquired to assure reliable service to Western's customers. Costs are based on analysis of system operation/maintenance requirements/concerns, customer-coordinated workplans, actual costs of recent similar projects, and bottom-up budgeting techniques	7,920	10,508	7,165
■ Interest payments to the U.S. Treasury will occur. Estimates are based on Power Repayment Studies for the Projects funded in this account	32,598	30,446	18,689
Total, Equipment, Contracts and Related Expenses	99,260	74,183	84,293

System Statistics

	FY 1998	FY 1999	FY 2000
Generating Plants (Number)	56	56	56
Generating Capacity:			
Installed Capability (kW)	10,605,000	10,605,000	10,605,000
Substations:			
Number	258	258	258
Capacity (kVA) [a]	26,442,498	26,446,748	26,446,748
Transmission Lines (Circuit Miles):			
500-kV	448.27	448.27	448.27
345-kV	1,628.34	1,628.34	1,628.34
230-kV	6,880.13	6,880.13	6,880.13
161-kV	840.66	840.66	840.66
138-kV	329.59	329.59	329.59
115-kV	5,770.75	5,770.75	5,770.75
69-kV and below [b]	955.96	955.96	955.96
Total circuit miles	16,853.70	16,853.70	16,853.70

[a] Transformation increases completed in FY 1998 include: 11,400 kVa at Derby Hill (Colorado); 25,000 kVa at Lovell (Wyoming); 33,000 kVa at Grand Forks (North Dakota); and 4,000 kVa at Leeds (North Dakota). Increases planned in FY 1999 include 1,250 kVa at Faith (South Dakota); and 3,000 kVa at Custer (Montana).

[b] In FY 1998, 3.4-miles of the Estes-Mary's Lake Powerplant Transmission Line (Colorado) was removed.

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Equipment, Contracts and Related Expenses	
■ Increases for power purchases reflects Western's increased firm annual contract commitment, the operational changes that resulted from the Glen Canyon Dam Environmental Impact Statement Record of Decision, and planning for increased purchases during periods of test flows associated with the endangered fish research which occur in hydrologically dry years.	+25,400
■ Deceases in supplies (-190,000) and equipment purchases (-3,343,000) occur because purchases associated with the replacement of the microwave system and digital radios to meet new Federal Communications Commission and National Telecommunications and Information Administration regulations are at a lower level than occurs in FY 1999.	-3,533
■ Planned interest payment to the U.S. Treasury in FY 2000 is less than FY 1999 because project principal payments are current. No deficit payment is included	-11,757
Total Funding Change, Equipment, Contracts and Related Expenses	+10,110

Estimate of Revenues [a]

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Boulder Canyon Project [b]	52,925	60,592	62,155	60,559	57,201	61,150	57,973
Central Valley Project	184,476	183,039	186,544	185,249	200,250	198,029	190,080
Colorado River Basin Project (Navajo) [c]	94,516	87,800	87,800	87,800	87,800	87,800	87,800
Falcon-Amistad Project [d]	3,888	3,282	3,292	3,292	3,292	3,292	3,292
Fryingpan-Arkansas Project	13,893	13,418	13,418	13,418	13,418	13,418	13,418
Pacific Northwest-Southwest Intertie Project [e]	6,671	15,696	16,896	18,096	19,296	20,496	21,696
Parker-Davis Project [f]	32,095	35,614	39,097	40,208	39,311	39,319	39,808
Pick-Sloan Missouri Basin Program	308,415	253,407	253,689	253,599	250,883	244,503	244,679
Provo River Project	267	247	247	234	233	232	233
Washoe Project	64	757	757	757	757	757	757
Colorado River Storage Project	158,518	116,151	115,728	116,391	116,400	116,400	118,418
Collbran Project	2,123	2,036	1,974	1,912	1,912	1,912	1,912
Rio Grande Project	1,781	2,296	2,211	2,127	2,127	2,127	2,127
Seedskadee Project	2,248	1,091	1,081	1,071	1,061	1,061	1,061
Dolores Project	2,912	2,908	2,908	2,908	2,908	2,908	4,030
Subtotal	864,792	778,334	787,797	787,621	796,849	793,404	787,284
Less Purchase Power & Wheeling Revenue Requirement [g]	0	0	-140,664	-140,664	-140,664	-140,664	-140,664
Total	864,792	778,334	647,133	646,957	656,185	652,740	646,620

[a] FY 1998 amounts reflect actual revenues. Unless otherwise noted, all project amounts in this table and the following sales table are based on FY 1997 Final Power Repayment Studies (PRS) except for Colorado River Basin Project revenues which are based on estimated projections since no PRS is prepared.

[b] Estimates for the Boulder Canyon Project are based on preliminary FY 1998 PRS estimates.

[c] Western has contractually agreed for the Salt River Project (SRP) to act as the scheduling entity and operating agent for the Central Arizona Project's (CAP) portion of the Navajo Generating Station's output (547 MW). In return, as Western retains marketing responsibility, SRP agreed to pay a monthly fixed and variable cost. This revenue meets CAP repayment requirements.

[d] Estimates for the Falcon-Amistad Project are based on preliminary FY 1998 PRS estimates. Outyears have been rounded for consistency of presentation.

[e] Estimates for the Pacific Northwest-Southwest Intertie Project are based on January 13, 1998 PRS.

[f] Estimates for the Parker-Davis Project are based on preliminary FY 1998 PRS estimates.

[g] Beginning in FY 2000, power customers are expected to provide for their purchase power and transmission wheeling requirements directly with suppliers. This action reduces Western's costs and revenues by approximately $141 million annually.

Estimate of Energy Sales [a]

(in gigawatthours) [b]

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Boulder Canyon Project	5,698	4,958	5,352	5,283	5,135	4,501	4,501
Central Valley Project [c]	10,418	8,236	8,383	8,530	8,678	8,678	8,282
Colorado River Basin Project (Navajo)	3,504	4,116	4,116	4,116	4,116	4,116	4,116
Falcon-Amistad Project	137	183	183	183	183	183	183
Loveland Area Projects [d]	2,201	2,051	2,051	2,051	2,051	2,051	2,051
Pacific Northwest-Southwest Intertie Project [e]	0	0	0	0	0	0	0
Parker-Davis Project	1,631	1,346	1,346	1,346	1,346	1,346	1,346
Pick-Sloan Missouri Basin Program (Eastern Division)	12,776	10,507	10,509	10,542	10,505	10,045	10,056
Provo River Project	32	24	24	24	24	24	24
Washoe Project	11	10	10	10	10	10	10
Salt Lake City Integrated Projects [f]	8,601	8,645	8,668	8,699	8,699	8,699	8,814
Subtotal	45,009	40,076	40,642	40,784	40,747	39,653	39,383
Less Firming Energy Purchases [g]	0	0	-6,418	-6,418	-6,418	-6,418	-6,418
Total	45,009	40,076	34,224	34,366	34,329	33,235	32,965

[a] FY 1998 amounts reflect actual sales. Unless otherwise noted in the previous table (Estimate of Revenues), all amounts in this table are based on FY 1997 Final Power Repayment Studies (PRS).

[b] One gigawatthour (GWH) equals one million kilowatthours (kWh).

[c] Estimates include sales into the Pacific Gas & Electric EA2 account.

[d] Loveland Area Projects include Fryingpan-Arkansas Project and Pick-Sloan Missouri Basin Program (Western Division).

[e] Pacific Northwest-Southwest Intertie shows no energy sales, but reflects revenues from the transmission of energy (refer to the Estimate of Revenue table). The Intertie Project is for transmission of energy only.

[f] Salt Lake City Integrated Projects include the Colorado River Storage Project, Collbran Project, Rio Grande Project, Seedskadee Project, and Dolores Project.

[g] Beginning in FY 2000, customers are expected to provide for their own firming energy needs, eliminating purchase power for resale.

Estimate of Proprietary Receipts

(dollars in thousands)

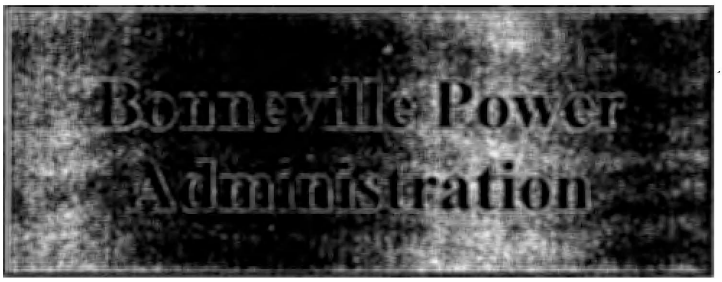
	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Falcon Amistad Maintenance Fund, 895178	644	1,010	1,309	1,309	1,309	1,309	1,309
Sale and transmission of electric power, Falcon and Amistad Dams, 892245	2,945	2,272	1,983	1,983	1,983	1,983	1,983
Sale of Power and Other Utilities Not Otherwise Classified, 892249	33,020	42,500	42,500	42,500	42,500	42,500	42,500
Sale of Power - Western Area Power Administration - Reclamation Fund, 895000.27 [a]	379,840	327,516	288,090	303,327	315,877	307,939	301,708
Total, Proprietary Receipts	416,449	373,298	333,882	349,119	361,669	353,731	347,500

[a] Beginning in FY 2000, power customers are expected to provide for their purchase power and transmission wheeling requirements directly with suppliers. This action reduces Western's receipts to Treasury by approximately $54 million annually.

Pending Litigation

City of Tacoma v. Hazel O'Leary, Secretary of the United States Department of Energy, No. C96-5699 RJB (W.D. Wash., filed July 22, 1996). In January 1996, Western Area Power Administration (Western) issued a notice to terminate a purchase power contract with the City of Tacoma. The effective date of the termination was February 1, 1997. Tacoma sued Western in U.S. District Court, alleging that Western violated the Administrative Procedure Act by: (1) exceeding its authority under the Reclamation Laws and Energy Act; (2) failing to consider the effects that terminating the purchase power contract would have on the economic well being of the City and its utilities; (3) exceeding its authority under the contract; and (4) failing to consider all relevant factors in making the decision to terminate the contract. Western believes that it acted properly in terminating the contract, in accordance with the terms of the contract. After Western terminated the contract, Tacoma amended its complaint by adding claims for breach of contract. Tacoma now seeks money damages of $144 million.

The United States believes that the U.S. District Court lacks subject matter jurisdiction over the complaint, and that the case should be heard in the U.S. Court of Federal Claims under the Tucker Act. The United States has filed an interlocutory appeal with the Ninth Circuit, seeking a ruling to this effect. The United States and Tacoma briefed the Ninth Circuit in February and March of 1998. The Federal Circuit held oral arguments on October 7, 1998. The Circuit has not issued a final order. Discovery in the case is stayed pending the outcome of the appeal.


Bonneville Power
Administration

Bonneville Power Administration

Proposed Appropriation Language

Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for *the Northeast Oregon Hatchery Master Plan, and for* official reception and representation expenses in an amount not to exceed [$1,500]*$3,000, Provided further,* That during Fiscal Year [1999] 2000 no new direct loan obligations may be made.

(Energy and Water Development Appropriation Act, 1999.)

Explanation of Change

The proposed FY 2000 appropriation language authorizes construction of facilities as required by the Pacific Northwest Electric Power and Planning Act for new fish and wildlife facilities of $1 million and an economic life greater than 15 years (Public Law 96-501, section 4, (H)(10)(B).

The proposed appropriation language authorizes reception and representation expenses in FY 2000 to increase over FY 1999 and restricts new direct loans in FY 2000 as in FY 1999.

Bonneville Power Administration

Executive Budget Summary

Mission

Bonneville Power Administration (Bonneville, BPA) is the Department of Energy's electric power marketing administration for the Federal Columbia River Power System (FCRPS). As stated in BPA's Business Plan, BPA's strategic mission is to: (1) provide electric power, transmission, and energy efficiency in increasingly competitive markets, (2) support the achievement of BPA's responsibilities for fish and wildlife, energy conservation, renewable resources, and low-cost electric power for the region, (3) remain a low-cost producer and a creative and flexible marketer in the region, helping to ensure the economical and environmental health of the Pacific Northwest, and (4) value individual diversity, entrepreneurial spirit, personal responsibility and the public service of Bonneville employees. BPA's business strategies to fulfill its mission can be summarized as meeting the electric energy market price, managing costs to be competitive in providing services to customers, strengthening BPA's financial position, and reorienting the organization to be responsive, flexible and competitive.

BPA provides electric power (about forty percent of the electricity consumed in the region), transmission (about three-fourths of the region's high voltage transmission capacity), and energy efficiency throughout the Pacific Northwest, a 300,000 square mile service area. BPA markets the electric power produced at 29 Federal hydroelectric multipurpose dams in the Pacific Northwest by the Corps of Engineers and the Bureau of Reclamation, and acquires non-Federal power to meet the needs of its customer utilities.

Congress created BPA in 1937 as part of the Bonneville Project Act, providing BPA's basic statutory utility responsibilities and authorities. In 1974, passage of the Federal Columbia River Transmission System Act (Transmission System Act) placed BPA under provisions of the Government Corporation Control Act (31 U.S.C. 9101-9110) and provided BPA with "self-financing" authority through the BPA Fund, a revolving fund, allowing BPA to use its revenues from electric ratepayers to directly fund all programs and to sell bonds to the U.S. Treasury to finance the region's high-voltage electric transmission system requirements. In 1980, enactment of the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) expanded BPA's utility obligations and responsibilities to encourage electric energy conservation and develop renewable energy resources, and protect, mitigate and enhance the fish and wildlife of the Columbia River and its tributaries. In support of these expanded responsibilities, BPA's Treasury borrowing authority was expanded to allow the sale of bonds to finance conservation and other resources and to carry out fish and wildlife capital improvements.

BPA's program is mandatory, nondiscretionary. It receives no annual appropriations from Congress. BPA funds the expense portions of its budget and repays the Federal investment in FCRPS with revenues from electric rates. BPA is authorized to sell bonds to the Treasury up to a cumulative outstanding total of $3.75 billion (permanent, indefinite borrowing authority). Through FY 1998, BPA has returned approximately $14.9 billion to the Treasury for payment of FCRPS O&M (about $2.7 billion), interest (about $8.4 billion) and amortization (about $3.8 billion) of appropriations and bonds.

Bonneville made its full FY 1998 payment of over $804 million as scheduled. For FY 1999, BPA plans to pay the Treasury $607 million, of which $164 million is to repay investment principal, and $431 million is for interest. The FY 2000 Treasury payment is currently estimated at $618 million, including $164 million for repayment of principal, and $440 million for interest.

Bonneville's FY 2000 budget has been prepared on the basis of its three major areas of activity: power, transmission and conservation and energy efficiency. This structure supports Bonneville's ability to become more competitive in the rapid restructuring of the deregulated wholesale electric energy market. This industry deregulation stems largely from the 1992 Energy Policy Act and ensuing Federal Energy Regulatory Commission (FERC) orders (FERC orders 888 and 889) requiring separation of utilities power and transmission functions. As a Federal agency, Bonneville is not bound by law to comply with the orders, but chose to comply with the FERC orders because it views compliance as essential to successfully compete in the electric power market of the future. Further, Bonneville supports DOE's October 1995 "Power Marketing Administration Open Access Policy." This budget reflects Bonneville's functional separation of power and transmission and its accounting and budgetary implementation of major activities.

Strategy

BPA's FY 2000 budget incorporates the budget reductions BPA has made to remain competitive in the electric utility industry in the Pacific Northwest as the industry restructures itself. These budget estimates, however, are still subject to continual change due to rapidly changing economic and institutional conditions in the evolving competitive electric utility industry in the Pacific Northwest. The following table provides a summary of accrued expenditures.

FUNDING SUMMARY (accrued expenditures in millions of dollars)

	FY 1998	FY 1999	FY 2000
CAPITAL INVESTMENTS			
Power Business Line	$ 50	$ 83	$106
Transmission Business Line	$106	$136	$178
Conservation & Energy Efficiency	$ 14	$ 14	$ 1
Capital Equipment&Bond Premium	$ 44	$ 25	$ 35
[redacted]	[redacted]	[redacted]	[redacted]
Accrued expenditures will require budget obligations of	$232	$258	$352
[redacted]	[redacted]	[redacted]	[redacted]
Projects Funded in Advance	$2	$25	$25
CAPITAL TRANSFERS (cash)	$247	$164	$164
BPA NET OUTLAYS	-$178	-$61	-$23
BPA STAFFING (FTE)	2,778	2,800	2,800

FY 2000 Performance Measures

Produce gross revenues of over $2 billion from the $14 billion FCRPS investment and provide the U.S. Treasury $618 million for operation and maintenance costs and interest and principal payments for the Federal Columbia River Power System.

Invest $320 million in new capital assets for transmission, power, and conservation and energy efficiency.

Sell about 85,000,000 megawatt-hours of electricity.

Serve more than 300 wholesale utility and industrial customers and interconnected utilities.

Operate and maintain over 15,000 circuit-miles of electric transmission lines, about 360 electric substations and associated utility and general plant, with a combined transmission system capital investment of about $5 billion.

Provide and reliably operate about the federal Columbia River Transmission System which includes 80 percent of the 300,000 square-mile Pacific Northwest's high-voltage electric energy transmission capacity. Work with other regional utilities and others to ensure an effective, efficient power supply system for the region's population of more than 10 million persons.

J. A. Johansen

Judith A. Johansen
Administrator and Chief Executive Officer

Date 1/21/99

PROGRAM FUNDING PROFILE a/
(in thousands of dollars)

	FISCAL YEAR				
	1998	1999	1999	1999	2000
	Actuals	Prop. b/	Amend.	Revised	Prop.
Capital Investment Obligations					
1 Power Business Line c/	29,000	NA	-	56,000	79,000
2 Fish & Wildlife c/	27,000	NA	-	27,000	27,000
3 Transmission Business Line	120,000	NA	-	136,000	210,000
4 Conservation & Energy Efficiency	12,000	NA	-	14,000	1,000
5 Capital Equipment	44,000	NA	-	25,000	35,000
6 **TOTAL CAPITAL OBLIGATIONS**	232,000	258,000	-	258,000	352,000
Expensed and Other Obligations					
7 Expensed	2,151,000	2,026,000	-	2,111,000	2,117,000
8 Projects Funded in Advance	2,000	29,000	-	25,000	25,000
9 **TOTAL OBLIGATIONS (lines 6+7+8)**	2,385,000	2,313,000		2,394,000	2,494,000
10 Capital Transfers (cash)	247,000	164,000	-	164,000	164,000
11 **BPA TOTALS (lines 9+10)**	2,632,000	2,477,000	-	2,558,000	2,658,000
12 Staffing (FTE) d/	2,778	2,755	--	2,800	2,800

a/ BPA's FY 1999 budget has been prepared in accord with the Budget Enforcement Act (BEA) of 1990. Under this Act all BPA budget estimates are treated as mandatory and are not subject to discretionary "caps" in the BEA.
These estimates support activities which are legally separate from discretionary activities and accounts. Thus, changes to BPA estimates cannot be used to affect any other budgetcategories such as domestic discretionary, or defense discretionary which have their own legal dollar caps. Because BPA operates within existing legislative authority, BPA is not subject to a BEA "pay-as-you-go" test regarding its revision of funding estimates.

b/ These estimates reflect BPA's FY 1999 Congressional Budget Submission.

c/ The Power business line includes Fish & Wildlife in the Performance Summaries, which appears separately on line 2 of this table.

d/ FTE reflect 1998 actuals and updated estimates.

OVERVIEW

Bonneville Power Administration

General Overview

Bonneville provides electric power, transmission and energy efficiency throughout the Pacific Northwest. Created in 1937 to market and transmit the power produced by the Bonneville Dam on the Columbia River, Congress has since then directed Bonneville to sell at wholesale the power produced at a total of 29 Federal dams, and to acquire non-federal power and conservation resources sufficient to meet the needs of Bonneville's customer utilities. Bonneville serves a 300,000 square mile area including Oregon, Washington, Idaho, Western Montana, and parts of Northern California, Nevada, Utah and Wyoming.

The Transmission System Act placed Bonneville under the provisions of the Government Corporation Control Act (31 U.S.C. 9101-9110) and allows Bonneville to use its revenue from electric ratepayers to fund all programs directly through the BPA revolving fund, and sell bonds to the Treasury to finance the region's high voltage transmission requirements. The Northwest Power Act expanded Bonneville's utility obligations and responsibilities to meet requesting utility loads, encourage conservation and develop renewable resources, and to protect, mitigate and enhance the fish and wildlife of the Columbia River and its tributaries. In support of these responsibilities, Bonneville's borrowing authority was expanded to allow the sale of bonds to finance conservation and other resources and to carry out fish and wildlife capital improvements. This Act also required regional energy plans and programs and created the Northwest Power Planning Council (Planning Council).

Bonneville is "self-financed" by the electric ratepayers of the Pacific Northwest and receives no annual appropriations from Congress. Bonneville's statutory budget authority is provided by the revenue-generating and rate-setting authorities of the Bonneville Project Act of 1937. Under the Transmission System Act, Bonneville funds the expense portion of its budget and repays the Federal investment with revenues from electric rates. Bonneville's revenues fluctuate primarily in response to market prices for fuels and stream flow variations in the Columbia River System due to weather conditions and fish recovery needs. Bonneville's permanent, indefinite statutory borrowing authority authorizes the agency to sell bonds to the Treasury up to a cumulative outstanding total of $3.75 billion. Through FY 1998, Bonneville has returned approximately $14.9 billion to the Treasury in interest, amortization, and repayment of Federal power generation, operation, maintenance, and construction costs. Bonneville made its full FY 1998 payment of over $804 million as scheduled. Bonneville's projected total Treasury payments for FY 1999 and FY 2000 are $607 million and $618 million, respectively. Starting in FY 1997, Bonneville is directly funding Bureau of Reclamation Pacific Northwest power O&M costs and in FY 1999 will begin direct funding Corps of Engineer Pacific Northwest power O&M costs.

Bonneville's FY 2000 budget has been prepared on the basis of its three major areas of activity: power, transmission, and conservation and energy efficiency. This structure supports

Bonneville's competitiveness in the rapidly restructuring, deregulated wholesale electric energy market. This industry deregulation stems largely from the 1992 Energy Policy Act and ensuing Federal Energy Regulatory Commission (FERC) orders (FERC orders 888 and 889) requiring separation of utilities power and transmission functions. As a Federal agency, Bonneville is not bound by law to comply with the orders, but chose to comply with the FERC orders because it views compliance as essential to successfully compete in the electric power market of the future. Further, Bonneville supports DOE's October 1995 "Power Marketing Administration Open Access Policy." This budget reflects Bonneville's functional separation of power and transmission and its accounting and budgetary implementation of business lines (BLs). This budget proposes FY 2000 accrued expenditures of $ 2,116 million for operating expenses, $25 million for Projects Funded in Advance, $320 million for capital investments, and $164 million for capital transfers.

Spending levels in this budget are still subject to change due to several reasons, including continued review and adjustment of funding requirements by Bonneville to accommodate competitive dynamics in the region's energy markets and refinancing of non-federal debt service.

Program Mission

In 1995, Bonneville completed a Business Plan and an associated environmental impact statement. The Business Plan is the foundation and guidance for Bonneville's strategic evolution to competitive utility business lines of products and services. Bonneville's Business Plan is serving as the basis for development of Bonneville's Flight Plan. The Flight Plan development will provide for implementing agency and business line strategies, including specific targets for measuring performance. It is designed to be consistent with requirements of the Government Performance and Results Act of 1993. The objectives and performance measures below are consistent with the DOE Strategic Plan.

As stated in Bonneville's Business Plan, the strategic mission of Bonneville is:

To provide electric power, transmission, and energy efficiency in increasingly competitive markets.

To support the achievement of BPA's responsibilities for fish and wildlife, energy conservation, renewable resources, and low-cost power for the region.

To remain a low-cost producer and a creative and flexible marketer in the region, helping to ensure the economical and environmental health of the Pacific Northwest.

To value individual diversity, entrepreneurial spirit, personal responsibility and the public service of Bonneville employees.

Program Objectives

Following are the FY 1999 target areas and their associated goals and performance measures adopted by the Bonneville Administrator and CEO.

These measures are reported to the President, Congress, the Department of Energy, the General Accounting Office, and the Office of Management and Budget to meet the requirements of the Chief Financial Officers (CFO) Act (Public Law 101-576). Consistent with the following measures, Bonneville funding levels support the DOE Strategic Plan, specifically, the Strategic Goal 1, Strategy 6 regarding system reliability.

Public Responsibilities goals and targets:
A competitive wholesale power market, fostered by open, non-discriminatory transmission access.

- BPA conducts itself under the Standards of Conduct such that there's no need for remedial action by FERC.

Cost-based, below-market power products broadly available in Pacific Northwest.

High system reliability, availability, and sufficiency.

- Transmission: Outage frequency and duration for transmission circuits do not exceed Control Chart violation limits.
- Generation: Weekly Heavy Load Hour targets for available generation are achieved.

BPA's greening strategy leads to BPA being viewed as the pre-eminent green utility.

- Sell at least 30 aMW of preferred power products at a premium over the basic Subscription product, limiting BPA's net cost for renewable resources at no more than $15 million.
- Mechanisms are created that result in substantially greater progress toward the Regional Review goals for energy efficiency and renewable resource development.

Fish and wildlife obligations are met.

- Meet Biological Opinion spill requirements.

Strong relationships with Tribal governments, State and Federal entities, and constituents.

- Tribal satisfaction index $\geq$ 6.3 and composite State/Federal entities/Constituent index $\geq$ 6.9.

Unified fish and wildlife plan, which includes long-term certainty for the Federal Columbia River Hydro-system.

- Federal consensus is achieved on a preferred alternative for the Unified Fish & Wildlife Plan that meets BPA's fish and wildlife obligations: (a) by establishing performance standards and other measures to be undertaken by the hydropower system; (b) by defining requirements for "off-site" mitigation for hydro impacts (e.g., hatchery, habitat and harvest programs); and (c) while preserving below-market, at-cost power.

High Performance Organization goals and targets:
Safe and positive work environment.

- Recordable injuries $\leq$ 2.4 per 200,000 hours worked (100 employees) and no fatal injuries occur to BPA or contract employees working on BPA facilities.
- Number of developmental assignments (both formal and informal) involving minorities is increased over last year.

Employees who are motivated, productive, and focused on implementing BPA strategies.
- Measurable improvement in key gap areas identified in FY 1998 work environment survey:
- "Turf" issues target $\geq$ 77%;
- Uneven workload target $\geq$ 90%;
- Recognition target $\geq$ 79%.

Critical business systems are improved.
- BPA completes Y2K remediation on its transmission systems and business systems by Federal deadline of 3/31/99.
- Implement a system for regularly assessing, reporting, and managing Agency and business unit risks.
- Develop an FCRPS-wide capital budgeting process that includes risk-adjusted rates of return; implement for BPA capital in FY 2000 SOY budgets.
- Business Solutions Project.
- Revenue Process Study.

Customer Satisfaction goals and targets:
Very high customer satisfaction.
- Composite Agency customer satisfaction index $\geq$ 7.6.

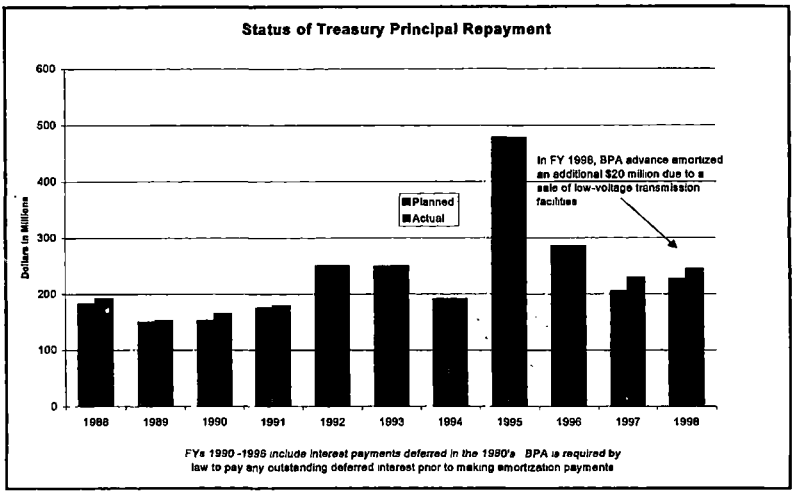
Finance goals and targets:
- High probability of cost recovery.
- Treasury payment made on time and in full, with Agency net revenues $\geq$ $54.

Performance Measures

The following are included in the Department of Energy's FY 1997 Consolidated Financial Statements and are also measured by the other power marketing administrations.

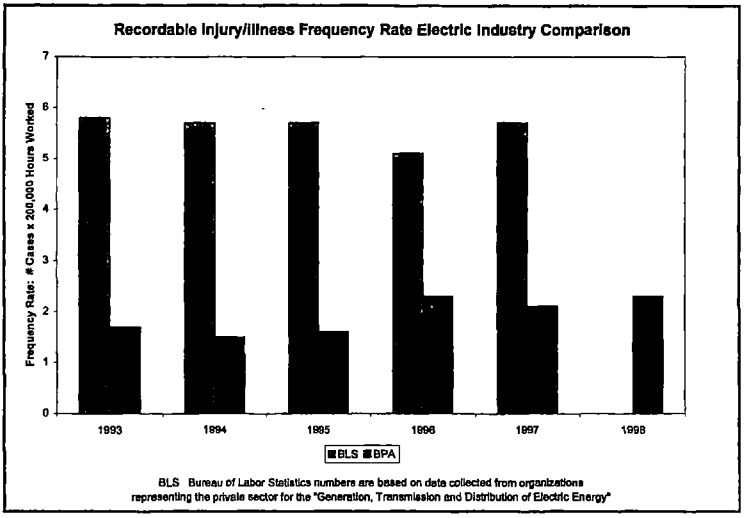
- *Repayment of Power Investment (Variance in Principal Payments)*: This indicator measures the variance of actual from planned principal payments to the U.S. Department of Treasury. The indicator will be zero if the actual payment is equal to the planned payment.

The following chart displays principal repayment only.



- *Safety Performance: Total Recordable Case Rate (Recordable Accident Frequency Rate)*: This indicator measures the recordable accident frequency rate by first multiplying the number of recordable injuries by 200,000. This number is then divided by the total hours worked. The PMAs measure their performance against a Bureau of Labor Statistic (BLS) standard industry case rate.

The national average recordable injury frequency rate shown below is based on Bureau of Labor statistics. The Bureau of Labor's data is collected from organizations representing the private sector in the generation, transmission, and distribution of electric energy. The Bureau of Labor Statistics reported a 1997 national average recordable injury frequency rate of 5.7 injuries per 200,000 hours worked. BPA's recordable injury frequency rate for FY 1998 was 2.3 injuries.



- *Transmission System Reliability: Control Performance Standard:* This indicator defines a standard of minimum control performance. Each control area is to have the best operation above this minimum that can be achieved within the bounds of reasonable economic and physical limitations. Each control area shall monitor its control performance on a continuous basis against two standards, CPS1 and CPS2. These two standards have very defined technical requirements.

This measure is consistent with the Department's Strategic Plan, specifically, Objective 1, Strategy 6. This strategy states that the Department will "Ensure that each power system control area operated by a PMA receives, for each month of the fiscal year, a Control Compliance Rating of 'Pass' using the North American Electric Reliability Council (NERC) Performance standard." A "Pass" is accomplished when each control area achieves a CPS1 compliance of 100% and achieves a CPS2 compliance of 90%.

In FY 1998, Bonneville Power Administration exceeded the minimum compliance level required by NERC with a CPS1 of 172.1% and a CPS2 of 99.94%. BPA began measuring CPS2 in January of 1998, therefore, the FY 1998 control performance is based on a partial fiscal year. Based on historic records, the CSP1 for FY 1997 was 173.68% and for FY 1996 was 168.86%. Data on CPS2 for FY 1997 and FY 1996 is not available.

Significant Accomplishments and Program Shifts

- Bonneville's FY 2000 budget reflects the significant financial and business events of the past year that have shaped Bonneville's response to the ongoing competitive pressures of

the region's electric utility industry. Throughout the past year Bonneville continued budget and FTE reductions necessary to enhance its competitive, cost-effective delivery of business-line utility products and services and continued delivery of the public benefits of its operations, while ensuring its ability to continue to make its payments to the Treasury on time and in full. Bonneville has completed three major cost reductions since early 1995. Combined, these cost reductions have reduced planned annual operating expense levels for FY 1996-2001 by an average $600 million from the levels in the FY 1995 Congressional budget, down nearly to the average actual operating expense level for FY 1993-1995.

- Bonneville's cost reductions have had a major impact on the agency's human resource levels, both Federal full-time equivalents (FTE) and contractor full-time equivalents (CFTE). In 1994, Bonneville established targets of reducing its FTE by 500 and its CFTE by 500, by FY 1997 as part of its competitive efforts. As a result of cost cutting, reorganization, and the availability of voluntary separation incentive authority (VSI) Bonneville has achieved its target goals. Despite the success of a 4-year effort to reduce its regular and contractor staff by 20 percent, further reductions were necessary. As reflected in this FY2000 budget, Bonneville has achieved additional FTE reductions resulting in a total of 2,778 in FY1998. As part of its succession planning efforts, Bonneville expects a small FTE increase in FYs 1999 and 2000 but is planning further reductions over time. Bonneville has initieated an effort in 1999 to complete a comprehensive multi-year staffing plan for FY 2001 and beyond.

- The organizational downsizing and cost-cutting have yielded benefits to Bonneville's ratepayers. Whereas Bonneville initially proposed to raise its power and transmission rates at the beginning of the 1996 rate process, it completed the process with an average 13 percent rate reduction for preference customers (public utilities, municipalities and cooperatives) stabilized over 5 years. While the amount of the decrease for customers individually varies with each customer's mix of products and services purchased, Bonneville estimates that the average rate for priority firm power is 2.44 cents per kilowatt-hour, down from the previous average rate of 2.81 cents.

- To achieve the rate reduction, Bonneville produced new, unbundled products and negotiated power sales contracts with its Northwest preference customers and 10 direct service industries. The new contracts provide a high degree of assurance that Bonneville can cover its costs through FY 2001 while enabling customers that wanted to diversify suppliers to do so. A higher proportion of contracts is now take-or-pay, reducing the risk of under recovery of costs. This ability to stabilize our customer load will provide Bonneville with additional time to meet anticipated future changes in the electric power industry and help assure our ability to meet Bonneville's Treasury payment obligations. Our goal has been to simultaneously become price competitive on a long-term basis, to bring enough stability to costs and revenues to retain customers, and to revise resource and marketing programs to reflect major changes in the agency's resource base and environmental obligations.

- The rate certainty provided by Bonneville's 1996 final rates has been augmented by the implementation of the Bonneville Appropriations Refinancing Act (part of the Omnibus Consolidated Recissions and Appropriations Act of 1996) that refinanced Bonneville's outstanding repayment obligations on appropriations. The legislation called for increasing low interest rates on historic appropriations to current Treasury market rates and resetting (reducing) the principal of FCRPS appropriations unpaid as of the end of FY 1996. New principal amounts were established as of the beginning of FY 1997, at the present value of the principal and annual interest payments BPA would make to the Treasury for these obligations in the absence of the Act, plus $100 million. The new principal amounts were then assigned new interest rates based on the Treasury yield curve rates prevailing at the end of FY 1996. BPA's outstanding repayment obligation on appropriations at the end of FY 1996 was $6.7 billion, with a weighted average interest rate of 3.4 percent. The refinancing reduced the principal amount to $4.1 billion, with a weighted average interest rate of 7.1 percent. As called for in the legislation, BPA submitted its calculations and interest rate assignments implementing the refinancing to Treasury for their review and approval. Treasury approved the implementation transactions in July, 1997.

- BPA started work on year 2000 compliance (Y2K) issues for its business, operations, and control systems in 1995. Recently, BPA established a Cross Agency Year 2000 team that is responsible for: 1)Business Systems - equipment and software, 2) Coordination with customers and suppliers, and 3)Reliable generation control and transmission systems. This team is currently undertaking the tasks of completing an inventory of systems and equipment that might have Y2K problems, making a risk assessment on each system, testing where needed, replacing/modifying software and hardware, and developing appropriate contingency plans. The intent of these efforts is to correct Y2K problems that could affect power system reliability, including coordination with entities having facilities connected to our transmission system. We will also have in place contingency plans to facilitate a smooth operational transition into the year 2000.

- Wholesale power marketing is becoming more uncertain and much more competitive in the Pacific Northwest as the electric utility industry undergoes wholesale deregulation. In 1995, demands on Bonneville for power dropped suddenly as the effects of wholesale electricity deregulation took hold, causing Bonneville to withdraw from the 248-megawatt Tenaska power project. As a result, Tenaska Power Partners II (Tenaska) and Chase Manhattan Bank (Chase), which provided the project funding, sued Bonneville for damages. Bonneville settled the lawsuit with Chase in June, 1996, agreeing to pay to Chase $115 million. BPA settled with several subcontractors of Tenaska for $29 million in FY1997 and $13.7 million in FY1998. In July 1998 arbitrators awarded Tenaska $159 million which was paid directly from the U.S. Treasury's judgment fund in November 1998. Bonneville will fully reimburse the Treasury for the judgment funds used plus interest, assuring that taxpayers are in no way affected by this award. In December 1998 Bonneville made its first reimbursement payment of $80.4 million to the Judgement Fund Branch. The remainder of the debt

will be paid in three equal payments concluding in August 2001. Consistent with a Memorandum of Understanding with the U.S. Treasury, BPA will make interest payments on the outstanding debt to the U.S. Treasury's "miscellaneous receipts" account.

- Bonneville faces unprecedented challenges in continuing its service to the Pacific Northwest. Market prices falling to near parity with Bonneville's rates have brought new competition, while at the same time the costs of Bonneville's commitment to rebuild salmon runs have risen sharply. Congress and the Administration have helped immensely by providing certainty to BPA's contribution to Northwest fish and wildlife restoration and mitigation. BPA, the Administration, and other agencies finalized an interagency agreement. The agreement ensures a stable level of fish and wildlife costs through 2001, while also confirming BPA's obligation to fund fish and wildlife activities for the 1995 Biological Opinion (BO) of the National Marine Fisheries Service (NMFS).

- This OMB budget is consistent with the above interagency agreement that calls for BPA fish and wildlife funding of $252 million per year and hydro operations estimated to result in lost revenues and purchased power costs of $90-$280 million per year for the period FY 1996 through FY 2001. These hydro operations are estimated at $90 million to $280 million per year, depending on water supplies and market conditions. The $435 million annual average cost of the fish "cap" reported in the print and communications media refers to the agreed combined cost of BPA spending, hydro operations and related costs for fiscal years 1996-2001. Included with the budget schedules section of this budget document is the current tabulation of the history and forecasted future costs of BPA's fish and wildlife investments. No agreement has been reached at this time on Bonneville's Fish and Wildlife budget for fiscal years beyond 2001. Discussions within the Region are currently taking place for a planning range for costs in the years beyond FY 2001. As of mid-August 1998, there are 13 alternatives being considered which have a range of annual average expenditures of $438 million to over $724 million.

- Related to this, in 1995, the Administration completed an agreement with members of the Northwest Congressional Delegation. This agreement recognized Bonneville's use of Section 4(h)(10)(C) of the Northwest Power Act to apply credits to Bonneville's Treasury payment for previous Bonneville expenditures attributable to non-power hydro project costs collected through Bonneville power rates. Under the agreement, Bonneville will receive annual credits on a permanent basis for its fish and wildlife expenditures. Bonneville is allowed credits for power purchase costs relating to its fish and wildlife programs in Fiscal Years 1997-2001, and is able to access historical credits for certain purposes as described below.

- In October 1995, the OMB in a letter to Congress, reiterated and extended the Administration's commitments made earlier. One of the program elements that the OMB Director elaborated on was that the Administration would establish a BPA Fish

Cost Contingency Fund consisting of credits to be used by BPA against fish and wildlife costs under certain conditions. BPA has certified in February, 1997, to the Treasury that the amount of available, but unused, credits is approximately $325.2 million.

- As discussed in the September 13, 1996, interagency "Memorandum of Agreement concerning The Bonneville Power Administration's Financial Commitment for Columbia River Basin Fish and Wildlife Costs" (MOA), BPA may access the fund when (1) court-ordered changes increase the cost of BPA's fish and wildlife Plan above specified target levels in the MOA; (2) when adverse hydro conditions cause the sum of decreases in nonfirm revenue and increases in power purchases to exceed a threshold value; and (3) when natural disasters or fishery emergencies result in additional system operations beyond those described in Part V (a) of the MOA. The credits for the certain emergencies are limited to an aggregate amount of no more than the $15 million per year. In order to implement the Administration agreement in the anticipated timely manner, financial information, approximate to that provided in the BPA certification was included in the BPA final 1996 Wholesale Power and Transmission Rate Case, which covers the five year period of FY 1997 through FY 2001.

- The Congress also enacted language to establish the residential exchange program benefits for FY 1997 while providing Conference Report language stating that, consistent with the Comprehensive Review of the Northwest Energy System, Bonneville and its customers should work together to gradually phase out the residential exchange by October 1, 2001. Consistent with the report language, Bonneville has reached settlement agreements with all publicly-owned utilities that have participated in the exchange program and all investor-owned utilities (IOU's).

- As the electric utility industry in the Pacific Northwest continues its restructuring and competitive development under wholesale deregulation, and Bonneville's competitive structure, and other factors, these budget estimates may have to change to enable Bonneville to meet its statutory responsibilities and obligations.

- The Comprehensive Review of the Northwest Energy System (the Regional Review) was convened on January 4, 1996, by the governors of Idaho, Montana, Oregon, and Washington. It served as a forum for discussion about the restructuring of the electric utility industry and what this restructuring will mean to the Pacific Northwest. The need for the regional forum was driven by deregulation and competitive changes in the wholesale power industry nationally. The governors received the Regional Review proposal on December 12, 1996. From BPA's perspective, the recommendations accomplish four important objectives: (1) creating the opportunity to retain the benefits of the Northwest Federal hydrosystem for Northwest consumers, (2) fostering the use of the Federal transmission system to help achieve a competitive power market for the benefit of all consumers, (3) improving the likelihood that taxpayers and bondholders will have their investment repaid, and (4) creating a funding mechanism for preserving important public benefits.

- In December, 1996, upon release of the Regional Review's final report, Bonneville and other regional parties immediately began to explore the actions necessary to implement the Regional Review recommendations. In early 1997, the governors representatives formed a Transition Board to ensure accountability, acceptance and implementation of the recommendations resulting from the Regional Review. The Northwest Congressional delegation asked the Governor's Transition Board in June 1997 to work with the Northwest Power Planning Council (Council) to establish a forum on Bonneville cost management issues beyond 2001.

- As a result of this request, a Cost Review Management Committee, comprised of outside experts and representatives from the Council and Bonneville, completed a review and released a set of draft recommendations in January 1998. Consistent with last year's Congressional report language, the draft recommendations were provided to Congress. The review recommends cost reductions and operational efficiencies averaging $146 million annually over the 2002-2006 period. These reductions would be in addition to significant cuts already planned by Bonneville and would result in total average annual reductions of about $240 million from current rate levels.

- In conjunction with a public review of the Cost Review recommendations, Bonneville established the Issues'98 process to provide the public with a broad overview of developments on multiple Bonneville policy initiatives. Bonneville is continuing to work with customers, state and federal agencies, tribal governments and interest groups on broad policy areas that will affect 2002-2006 financial planning assumptions leading to an initial power rate proposal for this same period. Bonneville has decided to adopt the cost recommendations in full. Success can occur only with aggressive cost management, improved operational efficiencies, and the cooperation of Bonneville's major power suppliers. This FY2000 Congressional budget reflects the expected final impacts from implementation of the Cost Review recommendations under current legislation and contractual agreements.

Bonneville Power Administration

Overview of Detailed Program Justifications

BPA's detailed justification summaries that follow present budget requirements of budget line items (BLI) on the basis of accrued expenditures. Accrued expenditure is the basis of presenting BPA's program funding levels in the power and transmission rate making processes, and the basis upon which BPA managers control their resources to provide products and services. Accrued expenditures relate costs to performance. Traditional budget obligation requirements for BPA's budget are shown on the Program and Performance Schedule prepared in accord with OMB Circular A-11.

The FY 2000 budget and these performance summaries reflect BPA's business line basis for utility enterprise activities. BPA has three major areas of activity on a consolidated budget and accounting basis: 1) Power, 2) Transmission, and 3) Conservation and Energy Efficiency. The Power business line includes line items for Fish and Wildlife, Residential Exchange, Associated Projects O&M Costs and Planning Council. Environmental activities are shown in the relevant business line, and in accord with OMB Circular A-11 guidance for revolving funds, reimbursable costs are incorporated within the associated business lines. All programs funded in advance will be fully funded by benefiting entities. BPA's interest expenses, pension & post-retirement benefits and its capital transfers to the Treasury are shown by program.

The first section of performance summaries, Capital Investments, includes accrued expenditures for investments in electric utility and general plant associated with the Federal Columbia River Power System's (FCRPS) generation and transmission services, conservation and energy efficiency services, fish and wildlife, and capital equipment. These capital investments will require budget obligations and new borrowing authority of $352million in FY 2000, $104 million more than forecast for FY 2000 in last year's Congressional budget submission. This increase is primarily due to increases in the Transmission Business Line which includes the fiber and Southwestern Oregon Coast Reinforcement projects, and the Business Services Project in Capital Equipment.

The forecasted capital funding levels for fiscal years 2000 and beyond will undergo further internal review as a result of implementing a capital asset management strategy. Consistent with the regional Cost Review Management Committee recommendations, this strategy will encompass prioritizing capital projects to be funded based on risk and other factors. Establishing this review process will help Bonneville in its efforts to compete in the deregulated energy market.

BPA's second section of the performance summaries, entitled Annual Operating Expenses, includes accrued expenditures for business line and program activities financed by power sales and transmission services revenues and projects funded in advance. For FY 2000, these

expenses will require budget obligations of $2,116. The total program requirements of all BPA programs include estimated budget obligations of $2,493 million in FY 2000.

CAPITAL PROGRAMS

Power Business Line - Capital

Mission Supporting Goals and Objectives

Associated Project Costs provide for direct funding of additions, improvements and replacements of existing U.S. Bureau of Reclamation and Corps of Engineers hydroelectric projects in the Pacific Northwest. The Bureau and Corps provide power production which is marketed by Bonneville and investing in additions, improvements, and replacements provides for increased performance and availability of generating units.

The Fish and Wildlife program provides for the protection, enhancement and mitigation of Columbia River Basin fish and wildlife losses attributed to the development and operation of hydroelectric projects on the Columbia River and its tributaries pursuant to Section 4(h) of the Northwest Power Act. BPA discharges a major portion of its fish and wildlife responsibilities and reduces the Administrator s obligation, by funding projects and activities designed to be consistent with the Northwest Power Planning Council s (Planning Council) Fish and Wildlife Program. BPA is also mandated to implement measures called for under the Endangered Species Act. These measures are part of the biological opinions (BO) issued by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) regarding the operations of the Federal Columbia River hydro system. The capital associated with implementing the reasonable and prudent alternatives of the BOs that relate to BPA s direct fish and wildlife program are included in this budget projection. Additionally, this capital budget reflects, and is consistent with, the fish and wildlife budget agreement announced by the Administration in October 1995 and the Memorandum of Agreement of September 1996 that calls for BPA fish and wildlife funding of $252 million per year and operations estimated to result in lost revenues and purchased power costs of $90-$280 million per year for the period FY 1996 through FY 2001.

Bonneville has been working with Columbia Basin tribes, state and federal agencies, and pubic interest groups to develop an expected range for Bonneville's fish and wildlife costs for 2002-2006. As of mid-July, 1998 the total estimated annual average financial impact on Bonneville, for the region's fish and wildlife programs ranges from $438 million to over $724 million per year. These costs are still being refined and are subject to change. Final decisions on overall regional fish and wildlife costs and the schedule for program implementation have not been made. Estimates beyond FY 2001 are expected to be available upon conclusion of the current agreement negotiations.

BPA's fish and wildlife capital program is directed at activities that increase numbers of Columbia River Basin fish and wildlife resources including projects designed to increase juvenile fish passage at mainstream dams, increase fish production and survival through construction of hatchery and acclimation facilities, fish monitoring facilities and fish habitat enhancement. Funding is also included for pre-engineering design and studies for new and developing projects. The priority for capital project funding will focus first on implementing the reasonable and prudent alternatives contained in the NMFS and USFWS Biological Opinions

and second, on implementing the Planning Council's Fish and Wildlife Program. A current goal of the Planning Council, and one supported by BPA, is that projects funded under both Bonneville's direct program as well as the reimbursable and capital investment components of the other Federal agencies will be reviewed and prioritized as part of a regional planning initiative process.

The FY 1997 Energy and Water Appropriations Bill added section 4(h)(10)(D) to the Northwest Power Planning and Conservation Act, directing the Power Council to appoint a Scientific Review Panel "to review projects proposed to be funded through that portion of Bonneville Power Administration's fish and wildlife budget that implements the Council's fish and wildlife program." And, ". . . in making its recommendations to BPA, the Council shall consider the impact of ocean conditions on fish and wildlife populations; and shall determine whether the projects employ cost effective measures to achieve program objectives." Consequently, projects funded under Bonneville's direct program will be reviewed and prioritized as part of the Planning Council initiative process.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Associated Project Costs	28,400	56,000	79,300	+23,300	+41.6%
Fish & Wildlife	22,100	27,000	27,000	0	0.0%
Total, Power Business Line - Capital	50,500	83,000	106,300	+23,300	+28.1%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Associated Project Costs

- Refine work with both the Corps and the Bureau to reach mutual agreement on which capital improvement projects need to be budgeted and scheduled, are cost effective and are of mutual benefit to provide system or site specific enhancements and efficiencies. These types of projects are in line with BPA's Strategic Business Objectives (SBOs) to keep the power system reliable, be the low cost provider, and operate in a more business-like manner

- Corps of Engineers (known projects to date):

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
FY 1998: Completed work on The Dalles, Units 15-22 Exciters Replacements. Completed work on Ice Harbor Unit 5 generator repair. Started work on Power System Reliability Improvements. Start work on Green Peter Rewinds. Assume funding responsibility for on-going John Day Rewind work. FY 1999: Complete work on Green Peter Rewinds. Complete work on John Day Rewinds. Continue work on the Power System Reliability Improvement. FY 2000: Continue work on Power System Reliability Improvement. All work is to increase the reliability and efficiency of the Federal Columbia River Power System.			
■ Bureau of Reclamation (known projects to date): FY 1998: Start work on Grand Coulee and Hungry Horse CO2 Replacements, Start Grand Coulee Third Powerhouse Station Service Transformer Replacement, Continue Grand Coulee Stator Replacements, Continue Grand Coulee Runner Replacements, Complete Minidoka Rebuild. FY 1999: Continue Grand Coulee Runner Replacements, Start Grand Coulee Transformer Replacements, Complete Grand Coulee Third Powerhouse Station Service Transformer Replacement, Complete Grand Coulee and Hungry Horse CO2 Replacements, Complete Grand Coulee Stator Replacements. FY 2000: Continue Grand Coulee Transformer Replacements. All work is to increase the efficiency and reliability of the Federal Columbia River Power System.			
Total, Associated Project Costs	28,400	56,000	79,300

Fish and Wildlife

- Although the regional prioritization process for projects to be recommended for funding in FY 2000 is not yet

(dollars in thousands)

FY 1998	FY 1999	FY 2000

complete, and is not expected to be completed until 1999, the following projects are candidates for capital funding. It is BPA's intention to proceed with design and construction of those projects from this list that are recommended for funding within the available budget. The costs indicated are preliminary estimates only and actual costs may be greater or lower than those estimates depending on final design and construction costs.

- 1. Andronmous fish supplementation facilties in the Yakima River Basin and Upper Snake River Basin include the following projects:
  -Hanford K-Basin Fall Chinook. The Hanford K-Basin fall chinook acclimation and Master Plan development in Hanford, Washington, which adjoins the Yakima River Basin, is for the development of a master plan to assess potential uses of non-adioactive cooling water intake settling ponds constructed for the now deactivated Hanford Nuclear K-Reactor. The settling ponds have potential as a facility for fishers enhancement and supplementation. The project also includes a fall chinook supplementation activity designed to enhance the adult return of fall chinook to the Hanford Reach of the Columbia River.
  -Wenatchee and Methow Rivers Coho Salmon. The Wenatchee and Methow Rivers coho salmon restoration in the Mid-Columbia River region of Washington, is for design and construction of acclimation and adult collection facilities.
  -Yakima River and Marion Drain Fall Chinook. The Yakima River fall chinook supplementation along the Yakima River near Yakima, Washington is for the design and construction of fish rearing, acclimation, and adult collection facilities on the lower Yakim River and Marion Drain irrigation return canal. These activities will occur near the cities of Yakima and Prosser, Washington.
  -Yakima River Coho Restoration. The purpose of this project is to determine the feasibility, design, and construction of acclimation sites in the Yakima River at various locations. This project may include

(dollars in thousands)

FY 1998	FY 1999	FY 2000

producing coho as part of the Yakima Indian Nation's salmon enhancement program. A long-range goal of the Yakima Indian Nation is to see the return of naturally spawning coho back to the Yakima River.
-Johnson Creek Summer Chinook. Johnson Creek summer chinook salmon restoration in South Fork Salmon Basin of Idaho is to develop, construct, and implement facilities for adult collection and holding, juvenile rearing, and acclimation.
-Spring Chinook Captive Broodstock for the Snake River. The Upper Snake River spring chinook captive broodstock program includes juvenile fish acclimation sites and adult collection facilities located within the Grande Ronde River Basin in Northeast Oregon and captive Broodstock hatchery rearinf facilties located at the Bonneville Dam site hatchery in Oregon and at the National Marine Fisheries Service research station, Manchester, Washington. Also included is the potential initiation of the Northeast Oregon Hatchery Master Plan. This project, as a measure in the Northwest Power Planning Council's (Council) Fish & Wildlife Program, would identify and develop artificial propagation facilities to protect and enhance salmon and steelhead native to the Imnaha, Grande Ronde and Walla Walla River Basins. The Master Plan is scheduled for submittal to the Council in April 1999 for review and approval. Following completion of a NEPA analysis by Bonneville in April 2000, final design could occur in the summer of 2000 and construction could be initiated in late FY 2000.

-Upper Snake River Spring Chinook Salmon Acclimation and Adult Collection. Upper Snake River spring chinook salmon captive Broodstock acclimation and adult collection facilities will be located on the Upper Grande Ronde River near La Grande, Oregon, on the Catherine Creek near Union, Oregon, and on the Lostine River near Enterprise, Oregon.
-Upper Snake River Spring Chinook Salmon

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Broodstock Rearing Facility. A Spring chinook salmon captive Broodstock rearing facility with be located both at Manchester, Washington and at Bonneville Dam hatchery, Oregon, for the purpose of rearing successive generations of juveniles to preserve the genetic integrity of Upper Snake river spring chinook salmon.

- 2. The Billy Shaw Reservoir resident fish substituion project on the Duck Valley Indian reservarion near Owyhee, Nevada. The purpose of this facility is for resident fish production as a substition for the loss anadronmous fish due to the construction and operation of the Federal Columbia River Power System. The facility involves the design and construction of a reservoir approximately 430 surface acres in size to rear various resident fish species.

- 3. The resident trout fish culture facility in Southeast Idaho or the Snake River Resident Fish Production Facility: This facility will ve located in Hagerman Valley, Idaho. The purpose of this facility is for resident fish production as a substition for the loss of anadromous fish due to the construction and operation of the Federal Columbia River Power System. This facility is intended to provide a supply of various species of trout for residents of the Duck Valley Indian Reservation, Nevada, and the Fort Hall Indian Reservation, Idaho. The facility involves the purchase of an existing hatchery facility and construction upgrades.
-Continue construction on the Yakima and Umatilla River hatcheries, and the Yakima Screens Facilities Phase II. Complete final design and initiate construction of the Nez Perce Hatchery, and initiate final design of the Bonneville Dam Fish Sampling Facility.
-Construct habitat improvement passage projects and small irrigation screening projects including development and enhancement of model watersheds.
-Continue implementation of high priority Endangered Species Act related projects, and

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
activities associated with the National Marine Fisheries Service Biological Opinion. -Continue acquisition and installation of pit tag monitors at federal dams in Snake and lower Columbia rivers.			
Total, Fish & Wildlife	22,100	27,000	27,000
Total, Power Services – Capital	50,500	83,000	106,300

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Associated Project Costs	
■ Funding increase is due to ramping up of the turbine runner and transformer replacements at Grand Coulee, power system reliability improvements, and increases for system maintenance activities	+23,300
Fish and Wildlife	
■ No change	0
Total Funding Changes, Power Services - Capital	+23,300

Transmission Business Line - Capital

Mission Supporting Goals and Objectives

The Transmission Business Line provides for all additions, upgrades, and replacements to the Federal transmission system in the Pacific Northwest, allowing reliable service to be provided to Northwest industrial users and utility customers. The transmission system also allows for the sale and exchange of power to and from the region.

The system replacement plan is to replace high-risk, obsolete, and maintenance-intensive facilities and equipment and to reduce catastrophic equipment failure by: 1) replacing high voltage transformers and power circuit breakers which are at or near the end of their useful life; 2) replacing risky, outdated and obsolete control and communications equipment; and 3) replacing all other existing high-risk equipment and facilities affecting the safety and reliability of the transmission system. Such accomplishments would also be controlled and guided by BPA's Reliability Centered Replacement (RCR) criteria.

BPA's operational telecommunications system is being upgraded to include fiber optics. The existing analog microwave system is exceeding its capacity, is approaching the end of its useful life, is no longer manufactured, has limited spare parts, and does not easily support digital signals. Parts of Bonneville's radio frequencies, especially in the two gigahertz range, could be at risk of becoming unavailable for use due to potential spectrum auction legislation. There is a potential loss of additional frequencies in future Federal Communications Commission spectrum auctions. Moving to fiber optic technology removes these risks. Fiber optics will provide a reliable and flexible communications system to monitor, control, and operate the power system at almost 400 sites in BPA's service area. The fiber optic cables will be designed to meet BPA's long term operational needs. Excess fiber capacity, in some cases, will be leased until they are required for operational use and is expected to have a 5 to 6 year payback. BPA is committed to repaying the initial fiber optic investments as fiber revenues exceed fiber operating costs and FERC-approved transmission rate case commitments are met. Bonneville is not competing with private sector providers.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Main Grid	10,200	21,000	20,800	-200	-1.0%
Area & Customer Services	4,800	14,200	35,400	+21,200	+149.3%
Upgrades & Additions	50,800	36,500	61,300	+24,800	+67.9%
Replacements	40,200	64,300	60,900	-3,400	-5.3%
Projects Funded in Advance	1,800	25,000	25,000	0	0.0%
Total, Transmission Business Line - Capital	107,800	161,000	203,4000	+42,400	+26.3%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Main Grid

- Strategic objectives: Bonneville's strategic objectives for main grid projects is voltage support and to assure compliance with WSCC and BPA reliability standards. During this budgeting period, projects are planned that will provide voltage support to major load areas that are primarily west of the Cascade mountains. Minor reinforcements in the Portland OR/Seattle WA corridor are also planned.

- Major accomplishments FY 98: (1) Completed the Northwest Montana/North Idaho Support facility which maintains the level of reliable service to the area particularly during winter; (2)Completed SW Portland Area Support Facility which prevents overloads of both BPA and Portland General Electric Company transmission facilities which otherwise would violate the NESC as well as cause equipment damage; (3) Completed 115 kV shunt capacitor bank addition at Sand Creek that helps prevent winter blackouts to loads between the Bonners Ferry, Idaho to Libby, Montana area; (4) Continued planning to identify other system reactive needs to mitigate unacceptable low or high voltage problems and other system additions.

- Planned major accomplishments FY 99: (1) Complete design, material acquisition and construction of the 500 kV shunt capacitor addition at Keeler substation that helps prevent winter blackouts in the Portland, Oregon and surrounding areas; (2) Complete design, material acquisition and construction of shunt capacitor additions at Pearl and Troutdale substations that prevents unacceptable low voltages in their respective, immediate areas which otherwise could cause damage to various electrical and electronic equipment; (3) Complete design, material acquisition and construction of 230 kV shunt capacitor addition at Shelton substation to prevent winter blackouts to the Olympic Peninsula area; (4) Complete design, material acquisition and construction of 230 kV shunt capacitor

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
addition at Redmond substation to prevent unacceptable low voltages in the Bend/Redmond, Oregon areas; (5) Complete design, material acquisition and construction of 115 kV shunt capacitor addition at Junction City substation to prevent unacceptable low voltages in the Eugene, Oregon area; (6) Complete design, material acquisition and construction of 230 kV shunt capacitor addition at McNary substation to provide voltage support for Interie transfers; (7) Complete design, material acquisition and construction of 230 kV shunt capacitor at the Ashe substation to prevent unacceptable low voltages that would affect operation of the WNP#2 nuclear plant; (8) Complete planning studies to mitigate overloads on the underlying transmission system for an outage of the 500 kV Paul-River line during summer conditions; (9) Continue planning studies to identify other system reactive needs to mitigate unacceptable low or high voltage problems and other system additions.			
■ Planned major accomplishments FY 2000: (1) Completion of 500 kV shunt capacitor addition at Paul substation that would prevent winter blackouts to the Seattle, Washington area; (2) Completion of planning studies for the East Seattle Reinforcement project which involves a second 500 kV line between Echo Lake and Raver substations, which will be needed to maintain reliable service to the Seattle area loads during winter; (3) Continue planning studies to identify other system reactive needs to mitigate unacceptable low or high voltage problems and other system additions.			
Total Main Grid	10,200	21,000	20,800
Area & Customer Services			
■ Strategic Objectives: Area and Customer Service projects assure that BPA meets the reliability standards and the contractual obligations we have to our customers for serving load growth.			
■ Major accomplishments FY 98: (1) Completed			

(dollars in thousands)

FY 1998	FY 1999	FY 2000

construction of the Columbia Falls Transformer Addition, to integrate the full capacity of the upgraded generation at Hungry Horse Dam; (2) Completed construction for the Chehalis Transformer Support facility, which will maintain reliable service in the Chehalis, Washington area; (3) Completed preliminary engineering and environmental coverage for the Teton Area Reinforcement facility, needed to prevent low voltages in the Teton, Idaho, and Jackson, Wyoming area; (4) Completed design, material acquisition and started construction for The Dalles Area Support, needed to prevent line overloads and low voltages in The Dalles area; (5) Completed preliminary engineering and environmental coverage for Albany-Eugene line rebuild to increase transmission capacity and improve reliability in the Eugene area; (6) Continued preliminary engineering and design for miscellaneous facilities required to meet contractual obligations and maintain reliable service for the BPA service area.

- Planned major accomplishments FY 99: (1) Complete preliminary engineering, environmental coverage and begin design for the Southwestern Oregon Coast Reinforcement Project to maintain reliability in the Southwest Oregon area and to provide new load service for the Nucor project. The Southwestern Oregon Coast Reinforcement Project consists of constructing 74 miles of 500kV line and a new substation in SW Oregon. Additionally, a new 500 kV breaker and additional systems controls would be installed in the current BPA system. Direct obligations for the Southwestern Oregon Coast Reinforcement Project in this budget period is $3 million for FY 1999 and $10.8 million for FY 2000. There has been a concerted effort by the state of Oregon, local officials and others to site a steel arc furnace plant near Coos Bay, Oregon. The Nucor Corporation, a major steel company based in North Carolina has announced its desire to build a new steel plant in that area. Bonneville, Nucor and Pacificorp conducted an electrical system impact study relating to the siting of an arc furnace near Coos Bay. The study concluded that (a) the existing Bonneville high voltage electric

(dollars in thousands)

FY 1998	FY 1999	FY 2000

transmission system in the area does not have the capacity to serve this potential 130megawatt (mw) electric load, with a projected 225 mw instantaneous peak, and other anticipated load growth on the south coast of Oregon and (b) a 500 kilovolt (kV) electric transmission line (costing about $80 million) would be needed from Eugene, Oregon, to Coos Bay, Oregon. Accordingly, the State of Oregon has requested Bonneville to initiate environmental impact studies on the Southwestern Oregon Coast Reinforcement Project so that an expedited construction schedule for the steel plant can be met. The State of Oregon has also agreed to fund the initial studies and Environmental Impact statement, which Bonneville has subsequently undertaken. The Bonneville Administrator had indicated that Bonneville will not begin construction of this project until (a) Bonneville has in place a long-term contract for transmission services for the plant which includes appropriate stranded cost protection if the plant should be terminated; (b) an adequate up-front Nucor payment is agreed to which will prevent cost shifting to other Bonneville transmission customers under its open access transmission tariff, and (c) all environmental work has been satisfactorily completed. The Bonneville Administrator has also indicated that if Nucor decides not to build the steel mill, Bonneville will stop pre-proposal activities, and suspend the environmental process, but continue to study the reliability of the federal transmission system serving Oregon's South Coast. The FY 2000 Bonneville Budget includes funding for the Southwestern Oregon Coast Reinforcement Project in order to assure that the Administrator is able to initiate construction of the line and associated substation facilities and modifications if (a) such transmission service is requested (b) the Administrator determines Bonneville can proceed in a manner that avoids both cost shifting to other Bonneville transmission customers and increased Treasury repayment risk, (c) a project that complies with the Northwest Forest Plan and the Oregon Plan for Salmon and Watersheds is identified, (d) the projects not adversely affect the protection to

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Oregon's fish and wildlife provided by existing habitat conservation plans, and (e) complies with all Oregon state law and regulations. (2) Complete design, material acquisition, and construction for the Albany-Eugene line rebuild to increase transmission capacity and improve reliability in the Eugene area; (3) Complete design, material acquisition and construction for The Dalles Area Support to prevent unacceptably low voltages and line overloads in The Dalles Area; (4) Complete design, material acquisition, and construction for the Bonneville-The Dalles line reconductor to prevent line overloads in the Hood River area; and (5) Continue preliminary engineering and design for miscellaneous facilities required to meet contractual obligations and maintain reliable service for the BPA service area.

- Planned major accomplishments FY 2000: (1) Continue design and begin material acquisition and construction for reinforcements for the Southwestern Oregon Coast Project to maintain reliability in the Southwest Oregon Area and to provide new load service for the Nucor project; (2) Complete design, material acquisition and begin construction to replace the cable and upgrade support and maintain reliability for the San Juan area in NW Washington; (3) Complete design, material acquisition and begin construction on the Shelton-Kitsap line rebuild to double circuit to provide voltage stability and prevent transformer and line overloads in the Kitsap area; (4) Complete design and construction of the Custer-Intalco contractual obligations and provide reliability to the Snohomish, Washington area; and (5) Continue preliminary engineering and design for miscellaneous facilities required to meet contractual obligations and maintain reliable service for the BPA service area.

  Bonneville Power has received a formal request for expanded service from Whatcom County PUD under the PUD's open access transmission contract with Bonneville. If Bonneville should determine that this request requires construction of additional transmission facilities, Bonneville will fund this project within the FY 99 and FY 2000 budget through

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
reprogramming of other projects and Whatcom would pay the cost of their transmission service as specified in their transmission contract with Bonneville.			
Total Area & Customer Services	4,800	14,200	35,400

Upgrades & Additions

- Strategic objectives: Upgrades and additions include replacing older communications and controls with newer technology including fiber optics in order to maintain or enhance the capabilities of the transmission system. During this budget period, BPA will complete design, material acquisition, and construction of several fiber optics facilities, which will provide future bandwidth capacity that will allow high-speed data transfers and replace current microwave radios which are becoming technologically obsolete and nearing the end of their useful life. Direct obligations for fiber optics included in this budget period are $35,800 for FY1998, $15,700 for FY1999, and $37,400 for FY2000. The above costs also include enhancements to computer systems at the Dittmer and Munro Control Centers which result in significant efficiencies in the areas of system operations and Transmission scheduling, thereby also providing increased customer services.
- Major accomplishments FY 98: (1) Completed design, material acquisition and construction of 790 total miles of fiber optics lines including Ross-Malin, Bell-Covington, and Keeler-Alvey. These projects are part of the overall upgrade to the operational telecommunication system to provide a reliable and flexible communication system; (2) Completed installation of various interim components associated with the OASIS (Open Access Sametime Info System) and the Scheduling Computer Project (SCP) consistent with efforts to separate Transmission and Power scheduling functions; (3) Completed installations of the Dispatchers Training Facility-Phase 2 (RODS Clone) at Dittmer; (4) Completed implementation of

(dollars in thousands)

FY 1998	FY 1999	FY 2000

various Remedial Action Schemes (RAS) throughout the system which allows for utilizing built in capabilities of the transmission system without having to add major facilities; (5) Completed strategic location of special measuring equipment that will provide valuable real time information to be used for developing future RAS or system additions; (6) Completed various relay upgrades at key 500 kV and 230 kV stations that maintains reliability of the control and protection of key transmission lines; (7) Continued planning, design, material acquisition, and construction of various system additions and upgrades required to maintain a reliable system for the BPA service area.

- Planned major accomplishment FY 99: (1) Complete design, material acquisition, and construction of 130 miles of fiber optics on the Covington-Blaine line; (2) Complete design, material acquisition, and construction of the HVDC Master Controller at Celilo that provides a cost efficient, simplified scheduling interface for scheduling power transfers on the DC Interie; (3) Complete design, material acquisition, and construction of the single pole relay upgrades at Big Eddy and John Day 500 kV stations to provide more reliable protection of key 500 kV lines; (4) Complete design, material acquisition and construction of the Inter Control Center Communications Protocol (ICCP) at Dittmer that provides System Operations the ability to communicate with other major utilities that utilize the same protocol; (5) Complete design, acquisition, and construction of communication circuit modifications at Eastern Control Center (ECC) that results in high reliability of a major communications path for system operation needs; (6) Complete design, material acquisition and construction of other RAS schemes that helps maintain levels of reliability and defer major cost additions; (7) Complete design, material acquisition, and construction of moving the Subgrid dispatch functions from Dittmer to Munro Control Center to provide more reliable and efficient dispatching; (8) Continue installation of various intermint components associated with OASIS and SCP; (9) Completion of Phase 1 of COMPASS

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
(Coordinated Outage Management, Planning, and Scheduling System) which will enhance outage coordination functions; (10) Continue planning, design, material acquisition, and construction of various system additions and upgrades required to maintain a reliable system for the BPA service area.			
▪ Planned major accomplishments FY 2000: (1) Complete design, material acquisition, and construction of up to 725 miles of fiber optics; two of which are the Alvey-Dixonville and the Alvey-Bandon Loop lines. These projects are a continuation of the overall upgrade to the operational telecommunication system; (2) Completion of the RODS Front End upgrade at Dittmer which maintains and enhances the capability of receiving real time info from the field that is used for system operations and Transmission scheduling purposes; (3) Completion of efforts to separate Transmission from Power scheduling functions; (4) Continue planning, design, material acquisition, anc construction of various system additions and upgrades required to maintain a reliable system for the BPA service area.			
Total Upgrades and Additions	50,800	36,500	61,300

Replacements

- Strategic objectives: Replacements are based on assuring compliance with reliability and safety standards. Replacements are both electric and non-electric. Included within non-electric replacements are environmental cleanups and included within electric replacements are replacement of PCB contaminated capacitors.

- Non-Electric Replacements:
  Major accomplishments FY 98: (1) Completed design, material acquisition, and construction of the Dittmer Control Center office space addition which lowers costs by consolidating staff in one location at a lower office cost; (2) Completed replacement of fire damaged equipment at the Ross Complex

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Electrical Lab; (3) Completed replacement of the Celilo DC Converter Station backflow preventer controls; (4) Completed design and construction of the new switchyard surfacing at Columbia Substation to maintain safety; (5) Completed design and start construction for the emergency replacement of the Cold Creek drainage system at Ross Complex to prevent catastrophic failure; (6) Completed design and started construction to upgrade the control house at Eugene Substation to improve operation and efficiency; (7) Implemented Reliability-Centered Replacement (RCR) based upon new capital asset management criteria.

Planned major accomplishments FY 99: (1) Complete design, material acquisition, and construction of the permanent Cold Creek drainage replacement at Ross Complex; (2) Complete design, material acquisition and construction of the Ross Substation Emergency Scheduling Center building addition for mandated separation of TBL & PBL scheduling functions; (3) Complete various necessary non-electrical replacements based on RCR implementation.

Planned major accomplishments FY 2000: Complete various non-electric replacements as necessary.

- Electric Replacements (Transmission lines, Substations, System Protection, and System Controls replacements):

  All electrical replacements were accomplished to maintain a reliable electrical system at the least cost by strategically replacing critical items.

  Major accomplishments FY 1998: (1) Continued replacing deteriorating wood pole transmission line structures; (2) Completed construction on the major tower relocation caused by landslide in Satsop-Aberdeen #2 & #3 transmission line; (3) Completed construction on the structure relocation on Keeler-Tillamook #1 transmission line; (4)

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Completed replacement of one failed Celilo DC tranformer unit; (5) Completed construction for one converter transformer rebuild at Celilo; (6) Completed replacement of high-risk 500 kV breakers at Lower Monumental Substation; (7) Completed replacement of 230 kV power circuit breakers as Snohmish, Maple Valley, Vantage and Conkelley Substations; (8) Completed replacement of high-risk 500 kV breaker at Vantage Substation; (9) Started design and material acquisition for replacement of the fire damaged transformer units at Hot Springs substation; (10) Started design, material acquisition for replacement of failed transformer units at Sacajawea substation; (11) Completed design, material acquisition and construction for replacements of PCB contaminated capacitors at various locations; (12) Replace system protection and system control equipment, other substation and line facilities as needed to maintain reliability using RCR criteria. Such replacements include relays, annunciators, oscillographs, various types of communication related equipment and SCADA equipment.

Planned major accomplishments FY 99: All electric replacements are planned to maintain a reliable electrical system at the least cost by strategically replacing critical items. (1) Complete replacement of failed transformer unit at Sacajawea substation; (2) Complete replacement of fire damaged tranformer units at Hot Springs; (3) Complete 500 kV breaker replacement at Slatt substation; (4) Complete 500 kV breaker replacement at Ashe substation; (5) Complete replacements of PCB contaminated capacitors. (6) Replace system protection and system control equipment, other substation and line facilities as needed to maintain reliability using RCR criteria. Such replacements include relays, annunciators, oscillographs, various types of communication related equipment and SCADA equipment; (7) Continue replacing deteriorating wood pole transmission line structures.

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Planned major accomplishments FY 2000: All electrical replacements are planned to maintain a reliable electrical system at the least cost by strategically replacing critical items. (1) Complete replacements of PCB contaminated capacitors at various locations; (2) Replace system protection and system control equipment, other substation and line facilities as needed to maintain reliability using RCR criteria. Such replacements include relays, annunciators, oscillographs, various types of communication related equipment and SCADA equipment; (3) Continue replacing deteriorating wood pole transmission line structures.			
Total Replacements	40,200	64,300	60,900

Projects Funded in Advance

This category includes those facilities and/or equipment where BPA retains ownership but which are funded by another entity, either in total in part through a cost-share agreement.

- Major accomplishments FY 98: (1) Continued design, material acquisition and began construction of the Southwest Portland Area Support facility. This facility will prevent overloads of the BPA and PGE facilities which would otherwise result in violation of the National Electric Safety Code and will eliminate equipment damage; (2) Completed design, material acquisition and begin construction for the Teton Area Reinforcement facility needed to prevent low voltages in the Teton, Idaho and Jackson, Wyoming area; (3) performed environmental cleanup and other work necessary for the sale of BPA facilities; (4) Complete other projects as requested by customers.

- Planned major accomplishments FY 99: (1) Complete design, material acquisition and construction of the Southwest Portland Area Support facility. This facility will prevent overloads of the BPA and PGE facilities which would otherwise result in violation of the National Electric Safety Code and will eliminate

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
equipment damage; (2) Complete design, material acquisition and construction of the Teton Area Reinforcement facility needed to prevent low voltages in the Teton, Idaho and Jackson, Wyoming area; (3) Perform environmental cleanup and other work necessary for the sale of BPA facilities; (4) Complete other projects as requested by customers.			
▪ Planned major accomplishments FY 2000: (1) Perform environmental cleanup and other work necessary for the sale of BPA facilities; (2) Complete other projects as requested by customers.			
Total Projects Funded in Advance	1,800	25,000	25,000
Total Transmission Services - Capital	107,800	161,000	203,400

Explanation of Funding Changes From FY 1999 to FY 2000:

	FY 2000 vs. FY 1999 ($000)
Main Grid	
▪ Minor decreased costs.	-200
Area & Customer Services	
▪ Increased costs associated with the Nucor project and For other customer area ..reinforcement projects.	21,200
Upgrades & Additions	
▪ Increased costs associated entirely with fiber optics projects.	+24,800
Replacements	
▪ Reduced costs associated with projected savings of Reliability Centered Replacement practices.	-3,400
Projects funded in Advance	
▪ No change	0
Total, Transmission - Capital	42,400

Conservation and Energy Efficiency - Capital

Mission Supporting Goals and Objectives

The competitive market situation is driving the need for alternatives to the traditional approaches to developing conservation resources. BPA is transitioning from centralized, BPA funded programs to new customer driven approaches. BPA is participating with other regional entities to support market transformation activities and development of energy efficiency services while facilitating activities which meet the needs of our customers and create business opportunities for the private sector in the Pacific Northwest.

Funding Schedule (Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Support for Power BL	14,300	14,000	1,000	-13,000	-92.9%
Government Functions	0	0	0	0	0.0%
Market Development	0	0	0	0	0.0%
Total, Conservation and Energy Efficiency - Capital	14,300	14,000	1,000	-13,000	-92.9%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Support for Power BL			
■ Support utilities in transition to locally funded conservation programs, and development of local conservation plans to meet specific customer needs. Oversee and monitor program close-out for residential, commercial, industrial, agricultural and conservation acquisitions.			
Total Support for Power BL	14,300	14,000	1,000
Government Functions			
■ BPA Market Transformation activities which previously have been capitalized are now being performed through the regionally funded Northwest			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
Energy Efficiency Alliance and are included in the Conservation and Energy Efficiency, Government Functions expense category.			
Total Government Functions	0	0	0
Market Development			
■ This function does not include any capital projects. Bonneville will operate within the 13 guidelines established as part of the Regional Review including the guidance for market development activities to be self-supporting by FY 2000.			
Total Market Development	0	0	0
Total Conservation and Energy Efficiency - Capital	14,300	14,000	1,000

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Support for Power BL	
■ Most of the conservation acquisition contracts requiring capital investments expire in FY 1999. As these contracts are completed, they are being replaced with new approaches for meeting Bonneville's public responsibilities to promote conservation and energy efficiency. Bonneville is working collaboratively with its ratepayers and other regional entities to develop customer-driven policies and non-governmental sources of funds for running customer-specific conservation and energy efficiency programs	-13,000
Government Functions	
■ No change	0
Market Development	
■ No change	0
■ Total Funding Change, Energy Efficiency	-13,000

Capital Equipment/Capitalized Bond Premium

Mission Supporting Goals and Objectives

This activity provides for the acquisition of general and dedicated special purpose capital automatic data processing (ADP) equipment, development of capitalized ADP software, and acquisition of special-use capital furniture and equipment in support of BPA's strategic objectives. This budget category provides the BPA business lines with the ability to acquire general and dedicated special purpose capital automatic data processing (ADP) equipment. This activity also provides the ability for developing capitalized ADP software, and acquiring of special-use capital furniture and equipment for BPA to meet its strategic business objectives.

Bonneville incurs a bond premium whenever it repays a bond before the due date. When bonds are refinanced, the bond premiums incurred are capitalized. Historically, BPA generally has chosen to finance capitalized bond premiums with bonds issued to the U.S. Treasury, as was envisioned in the Federal Columbia River Transmission System Act of 1974.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Capital Equipment	7,100	19,300	15,200	-4,100	-21.2%
Capitalized Bond Premium	37,000	6,000	20,000	+14,000	+233.3%
Total Capital Equipment/Capitalized Bond Premium	44,100	25,300	35,200	+9,900	+39.1%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Capital Equipment			
▪ Acquire capital office furniture and equipment, capital ADP-based administrative telecommunications equipment, ADP equipment (hardware), and support capital software development for all BPA programs.			
Total Capital Equipment	7,100	19,300	15,200
Capitalized Bond Premium			
▪ Continue to assess financial market and when cost-			

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
effective, refinance available bonds as prudent.			
Total Capitalized Bond Premium	37,000	6,000	20,000
Total Capital Equipment/Capitalized Bond Premium	44,100	25,300	35,200

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Capital Equipment	
■ Decrease due to phase in of Business Services project.....	-4,100
Capitalized Bond Premium	
■ Increase due to anticipated refinancing opportunities due to anticipated lower interest rates.....	+14,000
Total, Capital Equipment/Bond Premium – Capital.....	+9,900

OPERATING EXPENSES

Power Business Line - Operating Expense

Mission Supporting Goals and Objectives:

Production includes all BPA strategic resource planning and business development, short and long-term power purchases, wheeling, electric utility marketing of resources, generation and oversight costs, including the large thermal nuclear projects. These activities identify the Administrator's load obligations, plans and develops products and services to meet the needs of BPA customers, and acquire resources as needed. As a means of mitigating power market risk, Bonneville is a participant in the electricity futures market which was founded in March 1996 by the New York Mercantile Exchange.

Associated Projects provide funding for power related operation and maintenance costs; minor additions, improvements, and replacements; and liabilities of the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation hydroelectric projects in the Pacific which serve many purposes. Both agencies are emphasizing efficient power production from existing facilities and improvement of the performance and availability of power units. BPA pays additional financing costs of the Federal Columbia River Power System facilities through its Interest Expense and Capital Transfer budget programs. BPA is responsible for the actual operations and maintenance expenditures incurred as part of the Lower Snake River Compensation Plan (LSRCP) hatcheries and repays Treasury accordingly. Bonneville is responsible for annual payments to the Confederated Tribes of the Colville Reservation for their claims concerning their contribution to the production of hydropower by the Grand Coulee Dam in accordance with the Settlement Agreement between the United States and the Tribes (April, 1994).

Fish and Wildlife expenses provide for the protection, enhancement and mitigation of Columbia River Basin fish and wildlife losses attributed to the development and operation of hydroelectric projects on the Columbia River and its tributaries. BPA discharges a major portion of its fish and wildlife responsibilities pursuant to Section 4(h) of the Northwest Power Act by funding projects and activities designed to be consistent with the Northwest Power Planning Council's (Planning Council) Fish and Wildlife Program. To satisfy its responsibilities under the Endangered Species Act, BPA implements measures in the biological opinions issued by the NMFS and the USFWS regarding the operations of the Federal Columbia River hydro system. The expenses associated with implementing the reasonable and prudent alternatives of the biological opinions that relate to BPA's direct fish and wildlife program are included in this budget projection. Additionally, these expense amounts reflect, and are consistent with, the fish and wildlife budget agreement announced by the Administration in October 1995 and the Memorandum of Agreement of September 1996 that calls for BPA to make available fish and wildlife funding of $252 million per year and operations estimated to result in lost revenues and purchased power costs of $88-$285 million per year for the period FY 1996 through FY 2001. The 1998 Biological Opinion for steelhead increased the range estimated to result in lost revenues and purchased power costs by an average of $16 million per year through FY 2001.

BPA's fish and wildlife expense funds are directed at activities that increase numbers of Columbia River Basin fish and wildlife resources including projects designed to improve habitat conditions for fish and wildlife, juvenile fish passage at mainstream dams, resource studies, monitoring and

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evaluation, and facility operation and maintenance. The priority for project funding focuses first on implementing the reasonable and prudent alternatives contained in the NMFS and USFWS biological opinions, and second, on implementing the Planning Council's Fish and Wildlife Program.

The FY 1997 Energy and Water Appropriations Bill added section 4(h)(10)(D) to the Northwest Power Planning and Conservation Act, directing the Planning Council to appoint a Scientific Review Panel "to review projects proposed to be funded through that portion of Bonneville Power Administration's fish and wildlife budget that implements the Planning Council's fish and wildlife program." And, ". . . in making its recommendations to BPA, the Planning Council shall consider the impact of ocean conditions on fish and wildlife populations; and shall determine whether the projects employ cost effective measures to achieve program objectives." Consequently, projects funded under Bonneville's direct program will be reviewed and prioritized as part of the Planning Council initiative process.

The Northwest Power Act created the residential exchange program to extend the benefits of low-cost Federal power to the residential and small farm customers of investor-owned (IOU) and publicly-owned utilities. Due in part to concerns expressed during the 1996 rate case about BPA's expected reduction in Residential Exchange Program costs through June 30, 2001 (when exchange contracts expire), and thus a decrease in benefits to regional IOU and public agency program participants, the Energy and Water Development Appropriations Act, Public Law 104-46, established Residential Exchange costs at $145 million for fiscal year 1997. Conference report language encouraged BPA to reach settlement agreements with participants in order to "gradually phase out the Residential Exchange Program by October 1, 2001." The 1996 Comprehensive Regional Review also recommended that settlement discussions continue regarding the Residential Exchange Program. Settlement agreements have now been reached with all publicly-owned utilities that have participated in the exchange program and investor-owned utilities. Actual costs will differ pending finalization of a payment schedule.

The Northwest Power Act directs that expenses of the Planning Council, subject to certain limits based on forecasted BPA power sales, shall be included in BPA's annual budget to Congress. Funding for the Planning Council is provided by Bonneville and is recovered through Bonneville rates. Its major activities include the periodic preparation of a northwest Conservation and Electric Power Plan (a 20 year electric energy demand and resources forecast and energy conservation program) and a Columbia River Basin Fish and Wildlife Program of loss mitigation and resource enhancement actions.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Production	1,114,400	1,080,000	1,083,100	+3,100	+0.3%
Associated Projects Costs.	187,700	175,300	176,700	+1,400	+0.8%
Fish & Wildlife.	104,900	110,000	105,000	-5,000	-4.5%
Residential Exchange	74,500	61,100	61,200	+100	+0.2%
Planning Council	7,400	7,100	6,700	-400	-5.6%
Total, Power Services - Operating Expense	1,488,900	1,433,500	1,432,700	-800	-0.1%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Production

- Short-Term Power Purchases/PNCA Interchange: Purchase power for resale, fish mitigation or for the efficient operation of the power system. Under terms of the Pacific Northwest Coordination Agreement (PNCA), make payments to other generating utilities for power received as interchange energy. Interchange energy is energy transferred between utilities either to supply all or a part of any deficiency between a utility's actual energy capability and its firm energy load carrying capability or to return such energy to the supplying utility.

- Power Scheduling/Marketing: Schedule and market electric energy to BPA customers and Pacific Northwest's interconnected utilities. Place major emphasis on scheduling and supporting implementation of intertie access policy and streamflow coordination with the water budget of the Fish and Wildlife Program.

- Trojan: Continued termination and decommissioning of BPA's 30 percent share of the Trojan Nuclear Plant.

- WNP-2: Continued to acquire full capability of WNP-2.

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- WNP-1/WNP-3: Continued to fulfill contractual obligations for WNP-1 and WNP-3.

- Long-Term Power Purchases and Wheeling:
  FY 1998: Continue to acquire 100 percent of the Idaho Falls and Cowlitz Falls hydroelectric project output. Continue to acquire 100 percent of Wauna project output. Continued contract payments on four billing credit projects. The FY1998 cost level includes $159 million for costs awarded to Tenaska by arbitrators in July 1998 and paid directly from the U.S. Treasury's judgment fund in November 1998. Bonneville will fully reimburse the Treasury for the judgment funds used plus interest. In December 1998 Bonneville made its first reimbursement payment of $80.4 million to the Judgement Fund Branch. The remainder of the debt will be paid in three equal payments concluding in August 2001.
  FY 1999: Continue to acquire 100 percent of the Idaho Falls, Cowlitz Falls, Wauna and Wyoming Wind project output. Continue contract payments on four billing credit projects.
  FY 2000: Continue to acquire 100 percent of the Idaho Falls, Cowlitz Falls, and Wauna project output. Continue contract payments on four billing credit projects.

- Generation & Oversight:
  FY 1998: Continue to provide oversight of all contracts signed to date. Continued the environmental review and permitting of the Columbia Wind Farm Project. Started the National Environmental Policy Act (NEPA) process for the Fourmile Hill and Telephone Flat Geothermal Project. Continued to fund the Pacific Northwest Wind Resource Study and to co-fund the Regional Solar Monitoring Project. Provided oversight of large thermal generating plants from which BPA purchases capability. Coordinated operation of the Pacific Northwest and Canadian Power Systems. Provided litigation and legal services covering existing and prospective financing arrangements involving the nuclear generating projects; Columbia River Treaty, non-Treaty and related resources

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
issues. Includes major contract with the Department of Justice for the WNP-1 and WNP-3 cost sharing contracts signed to date. Issue Record of Decision for the Columbia Wind Farm Project. Continue the NEPA process for the Fourmile Hill and Telephone Flat Geothermal Project. Continue to fund the Pacific Northwest Wind Resource Study and to co-fund the Regional Solar Monitoring Project. Provide oversight of large thermal generating plants from which BPA purchases capability. Develop coordinated operation of the Pacific Northwest and Canadian Power Systems, investigate and analyze Canadian proposals for power export. FY2000: Continue to provide oversight of all contracts signed to date. Provide oversight of large thermal generating plants from which BPA purchases capability to insure that all BPA approval rights are protected; coordinate, communicate and administer agreements, issues and programs between BPA and the project owners.			
Total Production	1,114,400	1,080,000	1,083,100
Associated Project Costs			
■ Support FCRPS project costs and work to improve relationships to improve project support and better understand project costs. This helps to maintain FCRPS system integrity and the attainment of BPA's strategic business objectives.			
■ Bureau of Reclamation: FY 1998: Direct funding for O&M Power activities began. FY1999: Continue direct funding the Bureau for O&M Power activities. FY2000: Continue direct funding for O&M Power activities.			
Total Associated Project Costs	187,700	175,300	176,700

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Fish and Wildlife

In a manner consistent with the Fish and Wildlife Budget Memorandum of Agreement of October 1996:

- Anadromous Fish: Continue implementing projects which support Endangered Species Act listed species and other measures called for under the NMFS BO. Continue to fund and implement Northwest Power Act responsibilities and Planning Council's Fish and Wildlife program based on measures installed in FY 1996 and before. Continue to implement and develop downstream migration, disease and predator control programs, artificial production methods, and habitat improvement activities. These activities have been selected in response to the Pacific Northwest Electric Power Planning and Conservation Act (Power Act) to "protect, mitigate and enhance fish and wildlife including related spawning grounds and habitat on the Columbia River and its tributaries".

- Resident Fish: Continue to study the effects of reservoir operation on the resident fish population. Continue efforts for in-stream flow studies, stock status studies, habitat improvement and monitoring evaluation studies, and white sturgeon habitat requirements consistent with Endangered Species Act requirements. Continue activities associated with species under review for possible listing as threatened or endangered under the Endangered Species Act. Continued efforts conducted in FY 1997 and prior. These activities have been selected in response to the Pacific Northwest Electric Power Planning and Conservation Act (Power Act) to "protect, mitigate and enhance fish and wildlife including related spawning grounds and habitat on the Columbia River and its tributaries".

- Continue mitigation in resident fish for anadromous losses (substitution), mitigation for reservoir operation impacts to resident fish, and continue to refine, quantify, and delineate the difference between the two.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Wildlife: Continue the FY 1996 program including funding for wildlife actions resulting from Planning Council Fish and Wildlife Program amendments for wildlife mitigation. These activities have been selected in response to the Pacific Northwest Electric Power Planning and Conservation Act (Power Act) to "protect, mitigate and enhance fish and wildlife including related spawning grounds and habitat on the Columbia River and its tributaries".			
Total Fish and Wildlife	104,900	110,000	105,000
Residential Exchange			
Fiscal Years 1998, 1999 and 2000 include contract settlement agreement costs consistent with Congressional intent to phase out the Residential Exchange Program and the net cost of the remaining utility that has not yet settled. Settlement agreement costs will differ when a final payment schedule is determined.			
Total Residential Exchange	74,500	61,100	61,200
Planning Council			
Total Power Services	7,400	7,100	6,700
	1,488,900	1,433,500	1,432,700

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Production:	
■ Minor increased costs	+3,100
Associated Project Costs:	
■ Minor increased costs	+1,400
Fish and Wildlife:	
■ Reduction in FY 2000 due to anticipated efficiencies	-5,000

Residential Exchange:	
■ Minor increased costs	+100
Planning Council:	
■ Reflects efficiencies in operations	- 400
Total, Power Expense	-800

Transmission Business Line - Expense

Mission Supporting Goals and Objectives

This activity provides for the transmission system services of engineering, operations and maintenance for BPA's electric transmission system of 15,000 circuit miles (24,135 circuit kilometers) of lines, 360 substations, and associated power system control and communication facilities with an invested cost of more than $4.8 billion. Primary strategies of this program are: 1) maintain the safety and reliability of the transmission system; 2) increase the focus on customers; 3) optimize the transmission system; and 4) improve BPA s competitive position.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Engineering	22,500	24,900	25,100	+200	+0.8%
Operations	45,800	64,900	65,700	+800	+1.2%
Maintenance	116,000	115,500	113,600	-1,900	-1.6%
Total, Transmission Business Line - Operating Expense	184,300	205,300	204,400	-900	-0.4%

Detailed Program Justification:

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Engineering

- Continue efforts to identify best methods for improving system reliability and maintenance practices.
- Continue cost reduction efforts by identifying opportunities for low cost reinforcement & voltage support of the existing transmission system.

- R&D: Conduct in-house transmission system research and development, including (1) studies on reliability, HVDC (high voltage direct current) and HVAC (high voltage alternating current) outage reduction, (2) methods to update existing facilities and reduce maintenance costs including reliability-centered monitoring and recording methods for analysis.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
■ Technical Support: Provide technical support activities, such as transmission system planning and studies to optimize portions of the system.			
■ Capital-to-Expense Adjustments: Annually, BPA analyzes its outstanding capital work orders to assess whether they should be expensed.			
■ Reimbursable Transactions: BPA enters into written agreements with Federal and non-Federal entities that have work or services to be performed by BPA staff at the expense of the benefiting utilities. The projects must be beneficial, under the one-utility concept, to BPA operations and to the Federal or non-Federal entity involved. Additionally, these activities contribute to more efficient or reliable construction of the Federal transmission system or otherwise enhance electric service to the region.			
■ Leased Facilities: BPA leases delivery facilities and voltage support facilities to support the transmission system instead of building or purchasing new assets			
Total Engineering	22,500	24,900	25,100

Operations

- FY 1998: Continue to operate within parameters of regional transmission authorities. Prepare for increased complexity of outage scheduling, transmission scheduling, and dispatching in response to customer demand and increased competition between customers. FY 1999: Continue to operate within parameters of regional transmission authorities. Prepare for increased complexity of outage scheduling, transmission scheduling, and dispatching as well as impact of an expected high attrition rate

(dollars in thousands)

FY 1998	FY 1999	FY 2000

of skilled operations workforce by recruiting and training apprentices and system schedulers. Develop and implement Business system & tools. Implement Year 2000 changes in system control & general computer system software. FY 2000: Continue to operate within parameters of regional transmission authorities. Prepare for increased complexity of outage scheduling, transmission scheduling, and dispatching as well as impact of an expected high attrition rate of skilled Operation dispatching workforce by recruiting and training apprentices & skilled replacements. Continue development and implementation of Business systems & tools.

- Substation Operations: Perform operations functions necessary to provide electric service to customers and to protect the Government's investment in electric equipment. Includes equipment adjustments, switching lines and equipment during emergencies or maintenance, isolating damaged equipment, restoring service to customers, and inspecting equipment, reading meters, etc.

- Power System Control & Dispatching: Includes central dispatching, control, and monitoring of the electric operation of the Federal transmission system. Also includes load, frequency, and voltage control of Federal generating plants; and operation of the system control and data computers at Dittmer and Munro Control Centers.

- Operations Standards & Engineering: Includes analyzing system loads, voltage levels, outage information, stability levels and other data, and making policy recommendations for system operations and related affairs. Provides for development of control center requirements for centralized automation of substations and generation, and BPA participation with other utilities in developing utility operating standards

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
and guides.			
■ Marketing, Sales, & Services: Provides management and direction of Transmission Rates, provides business strategy in marketing of transmission and ancillary products and services of the Transmission Business Line.			
■ Transmission Scheduling: Provides open access to the Federal Transmission System consistent with transmission tariffs approved by FERC. Schedule and market transmission capacity to BPA customers, California ISO and Pacific Northwest's interconnected utilities. Manages the reservations and scheduling of all transmission services associated with the transmission tariffs.			
Total Operations	45,800	64,900	65,700

Maintenance:

(dollars in thousands)

FY 1998	FY 1999	FY 2000

- In all aspects of maintenance, Bonneville is shifting to the implementation of reliability-centered maintenance practices. This change is focused on improving system reliability and significantly reducing maintenance costs.
  FY 1998: Continued efforts to achieve the System Average Interruption Frequency Index (SAIFI) target of 4 or fewer automatic interruptions at 94 percent of BPA points of delivery (PODs) and the System Average Interruption Duration Index (SAIDI) target of 150 minutes or less of automatic interruptions at 94 percent of PODs. Implemented RCM practices in all of BPA's 7 O&M Regions. Continued to clarify maintenance geographic boundaries to better assure reponsive customer support. Continued high levels of vegetation management.
  FY 1999: Continue to refinc RCM practices at all of BPA's 7 O&M regions. Continue to improve performance to meet SAIFI and SAIDI targets as explained above. Incorporate maintenance of fiber optics cable with existing workload. Prepare for the impact of an expected high attrition rate of BPA's skilled maintenance workforce by recruiting apprentices and technical replacements for critical minimum crew size workload positions. Increase outage scheduling planning to increase customer satisfaction.

  Continue high levels of vegetation management.
  FY 2000: Continue to refine RCM practices at all of BPA's O&M regions. Continue to improve performance to meet SAIFI and SAIDI targets as explained above. Prepare for the impact of an expected high attrition rate among BPA's aging workforce by recruiting apprentices and replacements for critical minimum crew size workload positions. Increase outage scheduling planning to increase customer satisfaction. Continue high levels of vegetation management.

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000

- Transmission Line Maintenance: Maintain and repair nearly 24,135 km (15,000 circuit miles) of high voltage transmission lines, of which over 6,436 km (4,000 circuit miles) are 500-kV transmission EHV (extra-high voltage), which is two and one-half times more labor-intensive than lower transmission voltages, although more efficient in transmission of power. This responsibility includes maintaining transmission rights of way to ensure system reliability, safety and environmental compliance.

- Substation Maintenance: Provides for service and repair of the transmission system power equipment located at more than 360 work sites annually.

- System Protection Maintenance: Provides for the maintenance of relaying and metering equipment used to control and protect the electrical transmission system and to meter energy transfers for the purpose of revenue billing. Additionally, field engineering services provide technical advice and assure the correct operation of power system relaying and special control systems used to support interregional energy transmission capabilities.

- Power System Control Maintenance: Provides for the testing, repair, and field engineering support of BPA's highly complex equipment, communications and control systems, including seven major microwave systems and other critical communications and control systems that support the power system.

- Non-Electric Plant Maintenance: Provides for the maintenance of BPA's non-electric facilities. Includes site, building, and building utility maintenance; custodial services; station utility; and other maintenance service activities on BPA-owned or BPA-leased non-electric

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
facilities.			
■ Maintenance Standards & Engineering: Provides for establishing, monitoring, and updating system maintenance standards, policies, and procedures; and for the review and update of long-range plans for maintenance of the electric power transmission system.			
Total Maintenance	116,000	115,500	113,600
Total Transmission Business Line - Expense	184,300	205,300	204,400

Explanation of Funding Changes From FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Engineering	
■ Minor increased costs associated with leased delivery & voltage support facilities	+200
Operations	
■ Increased costs associated with hiring additional skilled technical dispatching and network operations personnel necessary to maintain the high reliability and safety requirements	+800
Maintenance	
■ Reduced costs associated with materials and efficiencies gained through reliability centered maintenance practices	-1,900
Total, Transmission Services - Expense	-900

Conservation and Energy Efficiency Services- Operating Expense

Mission Supporting Goals and Objectives

The competitive market situation is driving the need for alternatives to the traditional approaches to developing conservation resources. BPA is transitioning from centralized BPA funded programs to new customer driven approaches. BPA is participating with other regional entities to support market transformation and development activities while facilitating activities which meet the needs of our customers and create business opportunities for the private sector in the Pacific Northwest.

Funding Schedule (Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
Support for Power Business Line	22,400	20,500	18,500	-2,000	-9.8%
Government Functions	13,400	16,000	16,000	0	0.0%
Market Development	6,400	6,900	8,200	+1,300	+18.8%
Total, Conservation and Energy Efficiency - Operating Expense	42,200	43,400	42,700	-700	-1.6%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000

Support for Power BL

- Acquire conservation resources through competitive acquisition, billing credits and multi-sector mechanisms. Support utilities in transition to locally funded conservation programs and development of local conservation plans to meet specific customer needs. Oversee and monitor program close-out for residential, commercial, industrial, and agricultural conservation acquisitions.
- Energy Efficiency supports the Power business line in bundling energy efficiency and other services into future power sales. Energy Efficiency also provides technical support to the Power business line in the implementation, oversight and monitoring of existing

	(dollars in thousands)		
	FY 1998	FY 1999	FY 2000
power sales contract.			
Total Support for Power BL	22,400	20,500	18,500
Government Functions			
▪ Create and enhance markets through delivery of public benefits. Develop regional partnerships to explore which technologies to promote and the process to deliver them. Primarily provide leadership and collaborative funding for market transformation initiatives. Continue activities being performed through the regionally funded Northwest Energy Efficiency Alliance through a multi-party agreement signed in 1997.			
▪ Implementation of Bonneville's public responsibilities includes Sponsored Efficiency Initiatives managed in Energy Efficiency. These activities include providing technology leadership, technology transfer, policy leadership, and information sharing to the region and its ratepayers.			
Total Government Functions	13,400	16,000	16,000
Market Development			
▪ Work with regional customers and federal agencies to develop customized, tailored, services to meet specific needs and priorities; continue internal transition activities. The goal is to help and support public utility customers in maintaining a competitive edge in the marketplace. Bonneville will operate within the 13 guidelines established as part of the Regional Review including the guidance for market development activities to be self-supporting by FY 2000.			
Total Market Development	6,400	6,900	8,200
Total Conservation and Energy Efficiency	42,200	43,400	42,700

Explanation of Funding Changes from FY 1999 to FY 2000

	FY 2000 vs. FY 1999 ($000)
Support for PBL	
■ Minor decrease in activities	-2,000
Government Functions	
■ No change	0
Market Development	
■ Minor increase in activities	+1,300
Total Funding Changes, Conservation and Energy Efficiency	-700

INTEREST EXPENSE
&
CAPITAL TRANSFERS

Interest, Pension and Post-retirement Benefits Operating Expense

Mission Supporting Goals and Objectives

Interest expense provides for the payment of interest due on Federal Columbia River Power System (FCRPS) debt. This consists of capital investment in FCRPS hydroelectric generating and transmission facilities of BPA, the Corps of Engineers and the Bureau of Reclamation. Investments were financed by Congressional appropriations and BPA borrowings from the U.S. Treasury. BPA repays FCRPS debt through its power sales and transmission services revenues.

Since receiving Treasury borrowing authority in 1974 under the Transmission System Act, all BPA borrowings have been at market rates. As of October 1, 1996, all of BPA's repayment obligations on FCRPS appropriated investment (Corps and Bureau FCRPS investment and BPA investment financed with appropriations prior to the Transmission System Act) which were unpaid as of September 30, 1996, were restructured and assigned new current-market interest rates. The Bonneville Appropriations Refinancing Act of 1996 (Act) called for resetting (reducing) the unpaid principal of FCRPS appropriations and reassigning (increasing) interest rates. New principal amounts were established as of the beginning of FY 1997, at the present value of the principal and annual interest payments BPA would make to the U.S. Treasury for these obligations in the absence of the legislation, plus $100 million. The new principal amounts are then assigned new interest rates based on the Treasury yield curve rates prevailing at the end of FY 1996. BPA's outstanding repayment obligations on appropriations at the end of FY 1996 were $6.7 billion with a weighted average interest rate of 3.4 percent. The refinancing reduced the principal amount to $4.1 billion with a weighted average interest rate of 7.1 percent. Implementation of the refinancing took place in 1997, after audited actual financial data was available. As called for in the legislation, BPA submitted its calculations and interest rate assignments implementing the Act to Treasury for their review and approval. Treasury approved the implementation calculations in July 1997.

The Act also calls for all future FCRPS appropriations to be assigned prevailing Treasury yield curve interest rates.

Interest estimates are a direct function of costs of Treasury borrowing to BPA, repayment status of outstanding FCRPS investments, and projected additions to FCRPS plant in service. The interest cost estimates below include the impact of BPA's appropriation refinancing legislation.

Pension and Post-retirement Benefits assumes that the Bonneville will continue in FY 2000 to prospectively cover the full unfunded liability that will accrue in fiscal years after FY 1997 of the Civil Service Retirement and Disability Fund (Disability Fund), the Employees Health Benefits Fund (Health Fund) and the Employees Life Insurance Fund (Insurance Fund) that it has not covered prior to FY 1998. The unfunded liability is the difference in the current cost of paying

current Federal Columbia River Power System(FCRPS) employees retirement benefits and the sum of (1) seven percent withheld from current employees salaries and (2) an additional seven percent of wages that the FCRPS must already contribute into the Disability Fund each year. This FY 2000 Budget is consistent with the FY 1999 Budget which assumed the entire Bonneville CSRS cost recovery will be phased in over a ten-year period of time given that wholesale power and transmission rates for Bonneville are contractually frozen until the end of FY 2001 in order to meet competitive market pressures. The following amounts are assumed to be recovered by Bonneville: $2.2 million in FY 1998; $4.1 million in FY 1999; $ 6.0 million in FY 2000; $8.0 million in FY 2001; $55.2 million in FY 2002, $35.1 million in FY 2003 and $30.9 in FY 2004. A portion of these costs may be capitalized after further analysis is completed. FY 1998 through FY 2001 amounts are assumed to come from additional Bonneville expense cost reductions. After FY 2002, recovery is assumed to come from new revenues.

Cost estimates include Bonneville and the power related portion of Corps of Engineers, Bureau of Reclamation, and the United States Fish & Wildlife Pension and Post-retirement Benefits. These estimates are subject to further revision following further review. The Administration has determined that no additional legal authority is required for the Bonneville Power Administration to recover these expenses after FY 1997 and to deposit such recovery in the Miscellaneous Receipts of the U.S. Treasury.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	%Change
BPA Bond Interest (Net)	139,700	124,300	130,100	+5,800	+4.7%
BPA Appropriation Interest . . .	76,400	74,200	71,500	-2,700	-3.6%
Corps of Engineers . . . . . Appropriation Interest	167,200	166,400	170,500	+4,100	+2.5%
Lower Snake River Comp Plan Interest	16,500	16,600	16,700	+100	+.6%
Bureau of Reclamation . . . . . Appropriation Interest .	34,500	40,600	40,700	+100	0.0%
Total Interest - Operating Expense	434,300	422,100	429,500	+7,400	+2.2%
Pension & Post-retirement Benefits .	2,200	4,100	6,000	+1,900	+46.3%

Capital Transfers

Mission Supporting Goals and Objectives

This activity conveys funds to the U.S. Treasury for repayment of certain Federal Columbia River Power System costs not included in the Associated Project Costs budget. Since capital transfers are cash transactions they are not considered budget obligations.

Funding Schedule
(Accrued Expenditures)

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	$ Change	% Change
BPA Bond Amortization	212,000	121,800	142,000	+20,200	+16.6%
BPA Appropriation Amortization .	35,000	41,000	22,100	-18,900	-46.1%
Corps Appropriation Amortization	0	1,000	0	-1,000	-100.0%
Total, Capital Transfers	247,000	163,600	164,100	+300	+0.2%

SCHEDULES

(in millions of dollars) GRB 20-Jan-99

FISCAL YEAR

BP-1 SUMMARY	----1998----		---1999----		---2000---		2001	2002	2003	2004
	TOTAL OBLIGATIONS/OUTLAYS									
	Oblig.	Outlays	Oblig.	Outlay	Oblig.	Outlay	Oblig.	Oblig.	Oblig.	Oblig.
1 Residential Exchange	75	75	61	61	61	61	46	0	0	0
2 Power Business Line 1/	1,302	1,302	1,256	1,256	1,260	1,260	1,240	1,101	1,119	1,098
3 Transmission Business Line	304	290	341	341	414	382	428	380	385	361
4 Conservation & Energy Efficiency Services	54	56	57	57	44	44	37	34	32	32
5 Fish & Wildlife	132	127	137	137	132	132	132	108	111	114
6 Interest/ Pension 3/	436	436	426	426	436	436	465	530	510	515
7 Associated Project Costs - Capital	29	28	56	56	79	79	77	93	87	63
8 Capital Equipment	7	7	19	19	15	15	10	5	5	5
9 Planning Council	7	7	7	7	7	7	6	5	5	5
10 Projects Funded in Advanced	2	2	25	25	25	25	25	25	25	25
11 Capitalized Bond Premiums	37	37	6	6	20	20	5	7	7	6
12 **TOTAL OBLIGATIONS/ OUTLAYS 2/**	**2,385**	**2,367**	**2,391**	**2,391**	**2,493**	**2,461**	**2,471**	**2,288**	**2,286**	**2,224**

REVENUES AND REIMBURSEMENTS

BP-1 continued

(in millions of dollars)

		—1998—		—1998—		—2000—		2001	2002	2003	2004
		Accru.	Cash	Accru.	Cash	Accru.	Cash	Accru.	Accru.	Accru.	Accru.
13	Revenues 4/	2,314	2,422	2,427	2,427	2,459	2,459	2,516	2,354	2,372	2,412
14	Projects Funded in Advanced	2	2	25	25	25	25	25	25	25	25
15	**TOTAL**	2,316	2,424	2,452	2,452	2,484	2,484	2,541	2,379	2,397	2,437
	BUDGET AUTHORITY	(17)		(87)		8		(60)	(92)	(85)	(187)
16	**(NET)**										
17	**OUTLAYS**		(178)		(61)		(23)	(70)	(91)	(111)	(213)

1/ The Power Business Line includes Fish & Wildlife, Residential Exchange, Planning Council, and Associated Project Costs which have been shown separately for display purposes.

2/ BPA's FY 2000 budget has been prepared in accordance with the Budget Enforcement Act (BEA) of 1990. Under this Act all BPA budget estimates are treated as mandatory and are not subject to the discretionary caps included in the BEA. These estimates support activities which are legally separate from discretionary activities and accounts. Thus, any changes to BPA estimates cannot be used to affect any other budget categories which have their own legal dollar caps.

3/ Pension and Post-retirement Benefits assumes that the Bonneville CSRS cost recovery will be phased in over a ten-year period of time given that wholesale power and transmission rates for Bonneville are contractually frozen until the end of FY 2001. The FY 2000 Budget assumes that the following amounts will be recovered by Bonneville: $2.2 million in FY 1998; $4.1 million in FY 1999; $6.0 millionin FY 2000; $8.0 million in FY 2001; $55.2 million FY 2002; $35.1 in FY 2003; $30.9 in FY 2004. FY 1998 through FY 2001 amounts are assumed to come from additional Bonneville expense cost reductions. After FY 2001, recovery is assumed to come from new revenues.

4/ Revenues post FY 1998 include BPA accrued expenses, depreciation, net revenues,and 4(h) 10 (c) credits for the following amounts ; $14 million in FY1998 and $60 million annually for FYs 1999-2004. The FY1998 amount reflects accounting adjustments for prior year 4(h)10(c) credits (FYs 1995 - 1997).

BP-2

EXPENSED OBLIGATIONS/OUTLAYS
(in millions of dollars)
FISCAL YEAR

	—1998—		—1999—		—2000—		2001	2002	2003	2004
	Oblig.	Outlays	Oblig.	Outlay	Oblig.	Outlay	Oblig.	Oblig.	Oblig.	Oblig.
1 Residential Exchange	75	75	61	61	61	61	46	0	0	0
2 Power Business Line 1/	1,302	1,302	1,256	1,256	1,260	1,260	1,240	1,101	1,119	1,098
3 Transmission Business Line	184	184	205	205	204	204	209	190	190	190
4 Conservation & Energy Efficiency Services	42	42	43	43	43	43	36	34	32	32
5 Fish & Wildlife	105	105	110	110	105	105	105	103	106	109
6 Interest/ Pension 2/	436	436	426	426	436	436	465	530	510	515
7 Planning Council	7	7	7	7	7	7	6	5	5	5
8 **OBLIGATIONS/ OUTLAYS**	**2,151**	**2,151**	**2,108**	**2,108**	**2,116**	**2,116**	**2,107**	**1,963**	**1,962**	**1,949**
9 Projects Funded in Advance	2	2	25	25	25	25	25	25	25	25

CAPITAL OBLIGATIONS/OUTLAYS
(in millions of dollars)
FISCAL YEAR

BP-2 continued	—1998—		—1999—		—2000—		2001	2002	2003	2004
	Oblig.	Outlays	Oblig.	Outlays	Oblig.	Outlays	Oblig.	Oblig.	Oblig.	Oblig.
10 Conservation & Energy Efficiency Services	12	14	14	14	1	1	1	0	0	0
11 Transmission Business Line	120	106	136	136	210	178	219	190	195	171
12 Associated Project Costs - Capital	29	28	56	56	79	79	77	93	87	63
13 Fish & Wildlife	27	22	27	27	27	27	27	5	5	5
14 Capital Equipment	7	7	19	19	15	15	10	5	5	5
15 Capitalized Bond Premiums	37	37	6	6	20	20	5	7	7	6
16 TOTAL CAPITAL INVESTMENTS	**232**	**214**	**258**	**258**	**352**	**320**	**339**	**300**	**299**	**250**
BORROWING AUTHORITY TO										
17 FINANCE CAPITAL OBLIGATIONS 3,4/	**232**		**258**		**352**		**339**	**300**	**299**	**250**
BORROWING										
18 FINANCE OTHER OBLIGATIONS	**(2)**		**(178)**		**(180)**		**(255)**	**(154)**	**(173)**	**(210)**
19 TOTAL BORROWING AUTHORITY	**230**		**80**		**172**		**84**	**146**	**126**	**40**

1/ The Power Business Line includes Fish & Wildlife, Residential Exchange, Planning Council, and Associated Project Costs which have been shown separately for display purposes.

2/ Pension and Post-retirement Benefits assumes that the Bonneville CSRS cost recovery will be phased in over a ten-year period of time given that wholesale power and transmission rates for Bonneville are contractually frozen until the end of FY 2001. The FY 2000 Budget assumes that the following amounts will be recovered by Bonneville: $2.2 million in FY 1998; $4.1 million in FY 1999; $6.0 million in FY 2000; $8.0 million in FY 2001; $55.2 million FY 2002; $35.1 in FY 2003; $30.9 million in FY 2004. FY 1998 through FY 2001 amounts are assumed to come from additional Bonneville expense cost reductions. After FY 2001, recovery is assumed to come from new revenues.

3/ BPA's FY 2000 budget has been prepared in accordance with the Budget Enforcement Act (BEA) of 1990. Under this Act all BPA budget estimates are treated as mandatory and are not subject to the discretionary caps included in the BEA. These estimates support activities which are legally separate from discretionary activities and accounts. Thus, any changes to BPA estimates cannot be used to affect any other budget categories which have their own legal dollar caps. Because BPA operates within existing legislative authority, BPA is not subject to a Budget Enforcement "pay-as-you-go" test regarding its revision of funding estimates.

4/ Borrowing Authority to Finance Other Obligations represents the use of (positive), or building up of (negative), deferred borrowing. Deferred borrowing is created when Bonneville uses cash from revenues to liquidate capital obligations in lieu of borrowing. This creates the ability in future years to borrow money, when fiscally prudent, to liquidate revenue funded activities. The amount on this line, under the title "Borrowing Authority to Finance Other Obligations" represents the annual use, or creation of deferred borrowing. OMB has requested that Bonneville show this deferred borrowing as a resource carried forward from year-to-year in the manner displayed here. It is important to note that the borrowing authority amount on line 17 "Borrowing Authority to Finance Capital Obligations" is the amount which is tracked by the Congressional Committees.

BP-3

CURRENT SERVICES
(in millions of dollars)
FISCAL YEAR

	CAPITAL TRANSFERS	1998	1999	2000	2001	2002	2003	2004
	Amortization:	Pymts	Pymts	Pymts	Pymts	Pymts	Pymts	Pymts
20	BPA Bonds	212	122	142	74	187	137	138
21	Bureau Amortization	0	0	0	19	1	1	0
22	BPA Appropriations	35	41	22	47	24	26	17
23	Corps Appropriations	0	1	0	13	26	47	72
24	**TOTAL CAPITAL TRANSFERS**	**247**	**164**	**164**	**153**	**238**	**211**	**227**

STAFFING

24	**FULL-TIME EQUIVALENT EMP. (FTE) 1/**	**2,778**	**2,800**	**2,800**	**2,755**	**2,755**	**2,755**	**2,755**

1/ FTE figures assume continued availability of BPA's VSI authority, receipt each fiscal year through FY 1999 of "early out" authority from the Office of Personal Management, and that individuals depart as scheduled.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FY 2000 CONGRESSIONAL BUDGET SUBMITTAL
BPA STATUS of BORROWING
(in millions of dollars)

BP-4A

	FY 1998				FY 1999			
	Annual Capital Obs.	Borrow Auth.	Capital Expend.	Treasury Borrow.	Annual Capital Obs	Borrow Auth.	Capital Expend.	Treasury Borrow.
Cum. - Start-of-Year: 1974 Act	1,937		1,937		1,958		1,939	
Start-of-Year: 1980 Act	688		688		720		706	
Start-of-Year: Total	2,625	2,584	2,625	2,499	2,678	2,604	2,645	2,519
Plus: Annual Increase 1/								
Annual Increase: 1974 Act	164		164		161		161	
Annual Increase: 1980 Act	68		68		97		97	
Annual Borrowing A. Increase	232	232	232		258	258	258	
Treasury Borrowing (Cash)				232				258
Less:								
Bond Amortization: 1974 Act	162		162		122		122	
Bond Amortization: 1980 Act	50		50		0		0	
Total BPA Bond Amortization	212	212	212	212	122	122	122	122
Net Increase/(Decrease):								
1974 Act	21		2		39		39	
1980 Act	32		18		97		97	
Total	53	20	20	20	136	136	136	136
Cum. - End-of-Year: 1974 Act	1,958		1,939		1,997		1,978	
End-of-Year: 1980 Act	720		706		817		803	
End-of-Year: Total	2,678	2,604	2,645	2,519	2,814	2,740	2,781	2,655
Remaining Leg. Borrowing A.:								
1974 Act	542				503			
1980 Act	530				433			
Total Borrowing Authority	1,072	1,146		1,231	936	1,010		1,095
Total Legislated Borrowing A.	3,750	3,750		3,750	3,750	3,750		3,750

1/ In any given year, BPA may issue less debt than forecast depending on net revenues, Treasury interests rates, and other cash management factors. In such cases, BPA accumulates a deferred borrowing balance that it accesses as necessary in the future. For the preparation of this budget, BPA minimizes its level of debt financing by assuming an optimal allocation of borrowing resources between the Transmission Act cap and the Power Act cap. In addition, BPA continues to seek a reduction in its level of debt financing through the following; a) further reduction in capital spending, b) revenue financing, and c) exploring the use of third-party financing, if feasible.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FY 2000 OMB BUDGET SUBMITTAL
BPA STATUS of BORROWING
(in millions of dollars)

BP-4B

	FY 2000				FY 2001			
	Capital Obs.	Annual Borrow. Auth.	Capital Expend.	Treasury Borrow.	Capital Obs.	Annual Borrow. Auth.	Capital Expend.	Treasury Borrow.
Cum. - Start-of-Year: 1974 Act	**1,996**		**1,996**		**2,149**		**2,117**	
Start-of-Year: 1980 Act	**817**		**817**		**874**		**874**	
Start-of-Year: Total	2,813	2,772	2,813	2,687	3,023	2,982	2,991	2,865
Plus: Annual Increase 1/								
Annual Increase: 1974 Act	**245**		**213**		**234**		**234**	
Annual Increase: 1980 Act	**107**		**107**		**105**		**105**	
Annual Borrowing A. Increase	352	352	320		339	339	339	
Treasury Borrowing (Cash)				320				339
Less:								
Bond Amortization: 1974 Act	**92**		**92**		**74**		**74**	
Bond Amortization: 1980 Act	**50**		**50**		**0**		**0**	
Total BPA Bond Amortization 2/	142	142	142	142	74	74	74	74
Net Increase/(Decrease):								
1974 Act	**153**		**121**		**160**		**160**	
1980 Act	**57**		**57**		**105**		**105**	
Total	210	210	178	178	265	265	265	265
Cum. - End-of-Year: 1974 Act	**2,149**		**2,117**		**2,309**		**2,277**	
End-of-Year: 1980 Act	**874**		**874**		**979**		**979**	
End-of-Year: Total	3,023	2,982	2,991	2,865	3,288	3,247	3,256	3,130
Remaining Leg. Borrowing A.:								
1974 Act	**351**				**191**			
1980 Act	**376**				**271**			
Total Borrowing Authority	727	768		885	462	503		620
Total Legislated Borrowing A.	3,750	3,750		3,750	3,750	3,750		3,750

1/ In any given year, BPA may issue less debt than forecast depending on net revenues, Treasury interests rates, and other cash management factors. In such cases, BPA accumulates a deferred borrowing balance that it accesses as necessary in the future. For the preparation of this budget, BPA minimizes its level of debt financing by assuming an optimal allocation of borrowing resources between the Transmission Act cap and the Power Act cap. In addition, BPA continues to seek a reduction in its level of debt financing through the following; a) further reduction in capital spending, b) revenue financing, and c) exploring the use of third-party financing, if feasible.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FY 2000 OMB BUDGET SUBMITTAL
BPA STATUS of BORROWING
(in millions of dollars)

BP-4C

	FY 2002				FY 2003			
	Annual Capital Obs.	Borrow. Auth.	Capital Expend.	Treasury Borrow.	Annual Capital Obs.	Borrow. Auth.	Capital Expend.	Treasury Borrow.
Cum. - Start-of-Year: 1974 Act	**2,293**		**2,261**		**2,378**		**2,346**	
Start-of-Year: 1980 Act	**979**		**979**		**983**		**983**	
Start-of-Year: Total	3,272	3,231	3,240	3,114	3,361	3,320	3,329	3,203
Plus: Annual Increase 1/								
Annual Increase: 1974 Act	**180**		**180**		**185**		**185**	
Annual Increase: 1980 Act	**120**		**120**		**114**		**114**	
Annual Borrowing A. Increase	300	300	300		299	299	299	
Treasury Borrowing (Cash)				300				299
Less:								
Bond Amortization: 1974 Act	**71**		**71**		**137**		**137**	
Bond Amortization: 1980 Act	**116**		**116**		**0**		**0**	
Total BPA Bond Amortization 2/	187	187	187	187	137	137	137	137
Net Increase/(Decrease):								
1974 Act	**85**		**109**		**48**		**48**	
1980 Act	**4**		**4**		**114**		**114**	
Total	89	113	113	113	162	162	162	162
Cum. - End-of-Year: 1974 Act	**2,378**		**2,370**		**2,426**		**2,394**	
End-of-Year: 1980 Act	**983**		**983**		**1,097**		**1,097**	
End-of-Year: Total	3,361	3,344	3,353	3,227	3,523	3,482	3,491	3,365
Remaining Leg. Borrowing A.:								
1974 Act	**122**				**74**			
1980 Act	**267**				**153**			
Total Borrowing Authority	389	406		523	227	268		385
Total Legislated Borrowing A.	3,750	3,750		3,750	3,750	3,750		3,750

1/ In any given year, BPA may issue less debt than forecast depending on net revenues, Treasury interests rates, and other cash management factors. In such cases, BPA accumulates a deferred borrowing balance that it accesses as necessary in the future. For the preparation of this budget, BPA minimizes its level of debt financing by assuming an optimal allocation of borrowing resources between the Transmission Act cap and the Power Act cap. In addition, BPA continues to seek a reduction in its level of debt financing through the following; a) further reduction in capital spending, b) revenue financing, and c) exploring the use of third-party financing, if feasible.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FY 2000 OMB BUDGET SUBMITTAL
BPA STATUS of BORROWING
(in millions of dollars)

BP-4D

	FY 2004			
	Capital Obs.	Annual Borrow. Auth.	Capital Expend.	Treasury Borrow.
Cum. - Start-of-Year: 1974 Act	**2,426**		**2,394**	
Start-of-Year: 1980 Act	**1,097**		**1,097**	
Start-of-Year: Total	3,523	3,482	3,491	3,365
Plus: Annual Increase 1/				
Annual Increase: 1974 Act	**160**		**160**	
Annual Increase: 1980 Act	**90**		**90**	
Annual Borrowing A. Increase	250	250	250	
Treasury Borrowing (Cash)				250
Less:				
Bond Amortization: 1974 Act	**138**		**138**	
Bond Amortization: 1980 Act	**0**		**0**	
Total BPA Bond Amortization	138	138	138	138
Net Increase/(Decrease):				
1974 Act	**22**		**22**	
1980 Act	**90**		**90**	
Total	112	112	112	112
Cum. - End-of-Year: 1974 Act	**2,448**		**2,416**	
End-of-Year: 1980 Act	**1,187**		**1,187**	
End-of-Year: Total	3,635	3,594	3,603	3,477
Remaining Leg. Borrowing A.:				
1974 Act	**52**			
1980 Act	**63**			
Total Borrowing Authority	115	156		273
Total Legislated Borrowing A.	3,750	3,750		3,750

1/ In any given year, BPA may issue less debt than forecast depending on net revenues, Treasury interests rates, and other cash management factors. In such cases, BPA accumulates a deferred borrowing balance that it accesses as necessary in the future. For the preparation of this budget, BPA minimizes its level of debt financing by assuming an optimal allocation of borrowing resources between the Transmission Act cap and the Power Act cap. In addition, BPA continues to seek a reduction in its level of debt financing through the following; a) further reduction in capital spending, b) revenue financing, and c) exploring the use of third-party financing, if feasible.

TREASURY PAYMENTS
(in millions of dollars)
FISCAL YEAR

		1998	1999	2000	2001	2002	2003	2004
A.	**INTEREST ON BONDS & APPROPRIATIONS**							
	Bonneville Bond Interest							
1	Bonneville Bond Interest (net)	127	124	130	148	158	158	168
2	AFUDC 1/	25	9	9	10	11	11	10
	Appropriations Interest							
3	Bonneville	76	74	72	70	67	65	63
4	Corps of Engineers 2/	166	166	171	181	193	195	197
5	Lower Snake River Comp. Plan	17	17	17	17	17	17	17
6	Bureau of Reclamation Interest 3/	41	41	41	41	40	40	39
7	**Total Bond and Approp. Interest**	**452**	**431**	**440**	**467**	**486**	**486**	**494**
B.	**ASSOCIATED PROJECT COST**							
8	Bureau of Reclamation Irrigation Assistance	0	0	0	10	0	0	0
9	Bureau of Rec. O & M 4/	0	0	0	0	0	0	0
10	Corps of Eng. O & M	93	0	0	0	0	0	0
11	L. Snake River Comp. Plan O & M	12	12	14	15	15	16	17
12	**Total Assoc. Project Costs**	**105**	**12**	**14**	**25**	**15**	**16**	**17**
C.	**CAPITAL TRANSFERS**							
	Amortization							
13	Bonneville Bonds	212	122	142	74	187	137	138
14	Bureau of Reclamation Amortization	0	0	0	19	1	1	0
15	Corps of Engineers	0	1	0	13	26	47	72
16	Lower Snake River Comp. Plan	0	0	0	0	0	0	0
17	Bonneville Appropriations	35	41	22	47	24	26	17
20	**Total Capital Transfers**	**247**	**164**	**164**	**153**	**238**	**211**	**227**
21	**TOTAL TREASURY PAYMENTS 5/**	**804**	**607**	**618**	**645**	**739**	**713**	**738**

1/ This interest cost is capitalized and included in Bonneville's Transmission System Development, System Replacements, and Associated Projects Capital programs. AFUDC is financed through the sale of bonds.

2/ Includes interest on construction funding for Corps of Engineers (Corps) fish bypass facilities at Corps dams in the Columbia River Basin, including Lower Monumental, Ice Harbor, and The Dalles dams, as called for in the Fish Spillway Memorandum of Agreement approved on April 10, 1989.

3/ Includes $7.4 million paid by Bureau to Treasury on behalf of Bonneville.

4/ Costs for Bureau of Reclamation power O&M is funded directly by Bonneville as follows (in millions) : $42 in FY1998, $53 in FY1999, $51 in FY2000, $52 in FY2001, $53 in FY2002, $54 in FY 2003, $55 in FY2004. Starting in FY 1999, costs for Corps of Engineers power O&M (including O&M expense and small capital investments) is funded directly by Bonneville as follows (in millions) : $106 in FY1999, $107 in FY2000, $108 in FY2001, $114 in FY2002,. $118 in FY2003, $118 in FY2004.

5/ Does not include Treasury bond premiums on refinanced Treasury bonds of which $48 million was incurred in FY1998.

A-11-35A

DEPARTMENT OF ENERGY
FY 2000 CONGRESSIONAL BUDGET SUBMITTAL
BONNEVILLE POWER ADMINISTRATION FUND

OBJECT CLASSIFICATION STATEMENT
(in millions of dollars)

IDENTIFICATION CODE: 89-4045-0-3-271
DIRECT OBLIGATIONS

	ESTIMATES		
	1998	1999	2000
11.1 Full-time permanent	152	152	159
11.3 Other than full-time permanent	2	2	2
11.5 Other personnel compensation	15	15	16
11.9 **Total personnel comp.**	**169**	**169**	**177**
12.1 Civilian personnel benefits	39	39	41
21.0 Travel and transportation of persons	9	9	9
22.0 Transportation of things	5	5	5
23.1 Rental payments to GSA	10	10	10
23.2 Rents, other	6	6	7
23.3 Communication, utilities & misc. charges	5	5	5
24.0 Printing and reproduction	0	0	0
25.1 Consulting Services	11	11	11
25.2 Other services	1,363	1,367	1,427
25.3 Purchases from Government Accounts	170	170	177
25.5 R & D Contracts	2	2	2
26.0 Supplies and materials	52	52	54
31.0 Equipment	19	19	20
32.0 Lands and structures	17	17	17
41.0 Grants, subsidies, contributions	26	26	27
43.0 Interest and dividends	482	483	503
99.0 Subtotal obligations	2,385	2,390	2,492
99.9 **Total obligations**	**2,385**	**2,390**	**2,492**

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
FY 2000 CONGRESSIONAL BUDGET SUBMITTAL

Estimate of Proprietary Receipts
(In millions of dollars)

	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004
Bureau Interest	33	41	41	41	40	40	39
Bureau Amortization	0	0	0	19	1	1	0
Bureau O&M	0	0	0	0	0	0	0
Bureau Irrg. Assist.	0	0	0	10	0	0	1
Colville Settlement (credit)	-16	-17	-18	-19	-5	-5	-5
Total 1/	17	24	23	51	36	36	35
Corps O&M	96	N/A	N/A	N/A	N/A	N/A	N/A
LSRCP O&M	12	12	12	14	15	15	16
CSRS	2	4	6	8	55	35	31
	110	16	18	22	70	50	47
4(h)10(C) credit	-14	N/A	N/A	N/A	N/A	N/A	N/A
Total 2/	96	16	18	22	70	50	47

1/ Includes amortization of appropriations and irrigation assistance, and interest costs for the Bureau of Reclamation. The cost of power O&M for Bureau of Reclamation is no longer included in Proprietary Receipts due to Direct Funding by Bonneville. Represents transfers to Account [redacted]

2/ Includes O&M costs for the Corps of Engineers in FY 1998 only and the Lower Snake River Compensation Plan activities. Represents transfers to Account [redacted] Repayments on misc. recoverable costs, not otherwise classified.

Bonneville Direct Funding Costs for Bureau of Reclamation power O&M is as follows ($ in millions): $42 in FY1998, $53 in FY1999, $51 in FY2000, $52 in FY2001, $53 in FY2002, $54 in FY2003, $55 in FY2004

Starting in FY 1999, costs for Corps of Engineers power O&M budget (including O&M expense and small capital investments) is funded directly by Bonneville as follows (in millions) : $106 in FY1999, $107in FY2000, $108 in FY2001, $114 in FY2002, $118 in FY2003, $118 in FY2004.

Executive Summary
BPA Fish and Wildlife Funding Plan
(Dollars in Millions)
6/11/98

FY	Actuals 1996	Actuals 1997	Est 1998	Est 1999	Est 2000	Est 2001	98-01 Total	96-01 Avg	Est 2002	Est 2003	Est 2004
Direct Program Expenses											
MOA Plan	100.0	100.0	100.0	100.0	100.0	100.0	600.0	100.0	8/	8/	8/
Avg Expenditure Amount Available 1/	100.0	133.1	153.5	145.7	137.6	134.2					
Actual (FY96-97); Planned (FYs 98-01) 2/	68.5	82.2	110.0	110.0	105.0	105.0	580.7	96.8			
Carry Forward Balance 3/ 4/	31.5	50.9	43.5	35.7	32.6	29.2					
Reimbursable F&W Expenses of Other Agencies											
MOA Plan	38.4	40.5	40.5	40.5	40.5	40.5	240.9	40.2			
Avg Expenditure Amount Available	40.2	44.4	48.7	50.9	52.1	49.9					
Actual (FY96-97); Planned (FYs 98-01)	36.2	36.3	38.5	39.6	42.9	45.8	239.3	39.9			
Carry Forward Balance 4/	4.0	8.1	10.2	11.3	9.2	4.1					
Capital Investments Fixed Expenses											
MOA Plan	73.1	87.2	105.7	117.7	129.3	156.0	669.0	111.5			
Avg Expenditure Amount Available 1/	111.5	151.9	191.0	230.8	266.6	295.3					
Actual (FY98-97); Planned (FYs 98-01)	73.1	76.3	77.5	83.2	91.7	114.7	516.5	86.1			
Carry Forward Balance 4/	38.4	75.6	113.5	147.6	174.9	180.6					
Total											
MOA Plan	211.5	227.7	246.2	258.2	269.8	296.5	1,509.9	251.7			
Avg Expenditure Amount Available 1/	251.7	329.4	393.2	427.4	456.3	479.4					
Actual Expenditures	177.8	194.7	226.0	232.8	239.6	265.5					
Carry Forward Balance 4/	73.9	134.7	167.2	194.6	216.7	213.9					
River Operations											
Power Purchases 5/	15.0	15.0	87.0	87.0	87.0	87.0	378.0	63.0			
Foregone Revenues 5/	36.0	36.0	26.0	26.0	26.0	26.0	176.0	29.3			
Other 7/	51.0	51.0	51.0	51.0	51.0	51.0	306.0	51.0			
Total	102.0	102.0	164.0	164.0	164.0	164.0	860.0	143.3			
Grand Total	279.8	296.7	390.0	396.8	403.6	429.5	2,196.4	368.1 6/			
ESA Related Transmission Enhancements	0.0	12.7	0.0	0.0	0.0	0.0	12.7	2.1			

Assumptions:
Expenditure Plan and River Operations equal display in BPA's FY 1999 Congressional Budget. Actual Expenditures for all expenses and capital investments reflect FY 1996/1997 actual results. For FY's 1997 through 2001, program expenses and capital investments are consistent with the Fish and Wildlife Budget Memorandum of Agreement for fiscal years 1996 - 2001. This funding stream shows the most likely accruals related to Obligations from the NWPPC prioritization process. Actual accruals may be more or less during a given year within the 6 year MOA period.

Notes:
1/ In addition, $27 million per year in capital funding (borrowing) will be provided by BPA for the Direct Program through 2001. The Interest and Amortization for this is reflected in the Expenditures Plan for the Capital Investment category.
2/ This information is reported on an accrual basis. For Direct Program management purposes, BPA also reports these expenditures on an obligations basis. Typically the accruals lag the obligations, since not all funds are expended in the year in which they are obligated.
3/ BPA's FY 1996 - 2001 Fish and Wildlife Program Expense Budget is $100 million per year. Actual expenses for FY 1996 - 1997 were approximately $50.9 million less than what was available. BPA, in accordance with the MOA, will carry forward this amount with interest.
4/ Includes interest at 5.1 percent for FY's 1998 - 2001. The actual interest rate is determined annually. The interest rate for FY 1997/1998 was determined to be slightly less than 5.1 percent.
5/ Estimated for FY 1996-1997, actual amount will change when the river models are executed.
6/ During the initial discussions when developing the MOA, the "96-01 Avg" was estimated to be about $435 million.
7/ These estimated costs are related to limitations placed on operating ranges (forebay levels and generator efficiency) and other operations for fish which produce effects on power production not identified in Hydro regulation models.
8/ No agreement has been reached at this time on BPA's Fish and Wildlife Budget for fiscal years beyond 2001. Negotiations within the Region are currently taking place for a Fish and Wildlife Agreement for the years beyond FY 2001. As of mid-July 1998, there are 13 alternatives being considered which have a range of annual average expenditures of $438 million to over $724 million. Estimates beyond FY 2001 are expected to be available upon conclusion of the current agreement negotiations.

FISH AND WILDLIFE CROSSCUT

(dollars in millions)

WORKING DRAFT UPDATED 5/1/96	First Funded by:	FY 1978-FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	TABLE 1 Subtotal 78-84
CAPITAL INVESTMENTS							
BPA Fish and Wildlife 1/	BPA	0	0	0	0	0	0
Associated Projects (Federal Hydro) 2/	COE	30.0	17.9	61.7	55 1	9 0	173 7
TOTAL CAPITAL INVESTMENTS		30.0	17.9	61.7	55.1	9.0	173.7
PROGRAM OPERATING EXPENSES							
BPA DIRECT FISH AND WILDLIFE PROGRAM 1/							
Non-ESA Activities	BPA	2 3	2.3	4.6	9.1	19.6	37.9
ESA Activities	BPA	0 0	0.0	0.0	0.0	0.0	0.0
Subtotal		2 3	2.3	4.6	9 1	19.6	37.9
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) THRU FY 1993							
Existng Water Budget 3/	BPA	0 0	0 0	0 0	0 0	12 0	12.0
ESA Implementation 4/	BPA	0.0	0 0	0 0	0 0	0 0	0.0
Subtotal		0 0	0.0	0 0	0.0	12.0	12.0
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) EFF. FY 1994 5/							
U. Columbia River Water Budget	BPA	—	—	—	—	—	—
Spill for Juvenile/Adult Passage 6/	BPA	—	—	—	—	—	—
Flow Augmentation 7/	BPA	—	—	—	—	—	—
Reduced Forebay Levels	BPA	—	—	—	—	—	—
ESA - NMFS Fund (Add Spill for Juvenile Passage)	BPA	—	—	—	—	—	—
Subtotal							
REIMBURSABLE (ASSOC. PROJECTS - FEDERAL HYDRO)							
O&M Lower Snake River Hatcheries	USFWS	0.0	0.5	1.0	2.2	3.6	7.3
O&M Corps (w/bypass eff. FY 1992)	COE	15.0	5.4	7.6	9.1	10 0	47.1
O&M Bureau (hatchery eff. FY 1992)	BOR	0 0	0.0	0 0	0.0	0.0	0 0
Other (NW Power Planning Council)	BPA	0.0	0.2	2.9	2.9	2 4	8.4
Subtotal		15 0	6.1	11.5	14.2	16 0	62.8
TOTAL PROGRAM OPERATING EXPENSES		17.3	8.4	16.1	23.3	47.6	112.7
PROGRAM RELATED FIXED EXPENSES 9/							
Interest Expense	BPA	15 0	6 4	9 2	12.1	12.7	55 4
Amortization Expense	BPA	0.0	0.0	0.0	0 0	0.0	0.0
Depreciation Expense	BPA	9 0	2 4	3.2	3.8	3.9	22.3
TOTAL PROGRAM FIXED EXPENSES		24	8.8	12.4	15.9	16.6	77.7
GRAND TOTAL PROGRAM EXPENSES		41.3	17.2	28.5	39.2	64.2	190.4
FOREGONE REVENUES THRU FY 1993							
Spill (at Federal dams)	BPA	0 0	3.0	14.0	1.0	8.0	26.0
ESA Drawdown - Minimum Operating Pool 10/	BPA	0 0	0 0	0.0	0.0	0 0	0.0
		0.0	3.0	14.0	1.0	8.0	26.0
FOREGONE REVENUES FY 1994 5/							
U. Columbia River Water Budget	BPA	—	—	—	—	—	—
Spill for Juvenile Passage 6/	BPA	—	—	—	—	—	—
Flow Augmentation	BPA	—	—	—	—	—	—
Reduced Forebay Levels 10/	BPA	—	—	—	—	—	—
ESA - NMFS Fund (Add Spill for Juvenile Passage)	BPA	—	—	—	—	—	—
Subtotal							
TOTAL - PROGAM EXP. & FOREGONE REVENUES		41.3	20.2	42.5	40.2	72.2	216.4

THE ACCOMPANYING NOTES ARE AN INTEGRAL PART OF THIS TABLE.

FISH AND WILDLIFE CROSSCUT

(dollars in millions)

WORKING DRAFT UPDATED 5/1/96	First Funded by:	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	TABLE 2 Subtotal 85-90
CAPITAL INVESTMENTS								
BPA Fish and Wildlife 1/	BPA	10.2	8	4.7	7.7	8 3	16 2	55 1
Associated Projects (Federal Hydro) 2/	COE	46.4	9 1	78.6	7.6	5 3	4.5	151 5
TOTAL CAPITAL INVESTMENTS		56.6	17.1	83.3	15.3	13.6	20.7	206.6
PROGRAM OPERATING EXPENSES								
BPA DIRECT FISH AND WILDLIFE PROGRAM 1/								
Non-ESA Activities	BPA	15.9	19 6	22 2	18 8	23 0	32 8	132 3
ESA Activities	BPA	0 0	0.0	0.0	0.0	0.0	0.0	0 0
Subtotal		15 9	19 6	22 2	18.8	23.0	32.8	132.3
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) THRU FY 1993								
Existng Water Budget 3/	BPA	17.0	74 0	11 0	40 0	40.0	40 0	222 0
ESA Implementation 4/	BPA	0.0	0.0	0 0	0.0	0.0	0.0	0.0
Subtotal		17.0	74 0	11.0	40.0	40 0	40 0	222 0
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) EFF. FY 1994 5/								
U. Columbia River Water Budget	BPA	—	—	—	—	—	—	—
Spill for Juvenile/Adult Passage 6/	BPA	—	—	—	—	—	—	—
Flow Augmentation 7/	BPA	—	—	—	—	—	—	—
Reduced Forebay Levels	BPA	—	—	—	—	—	—	—
ESA - NMFS Fund (Add. Spill for Juvenile Passage)	BPA	—	—	—	—	—	—	—
Subtotal								
REIMBURSABLE (ASSOC. PROJECTS - FEDERAL HYDRO)								
O&M Lower Snake River Hatcheries	USFWS	5.4	4.9	5.8	5.1	7 6	8.3	37 1
O&M Corps (w/bypass eff FY 1992)	COE	11 4	15.8	20.7	10.5	12 3	11.5	82 2
O&M Bureau (hatchery eff FY 1992)	BOR	0 0	0 0	0.0	0.0	0 0	0 0	0 0
Other (NW Power Planning Council)	BPA	3 1	3 0	3.2	3 4	3 7	3 6	20.0
Subtotal		19 9	23.7	29.7	19 0	23 6	23.4	139 3
TOTAL PROGRAM OPERATING EXPENSES		52.8	117.3	62.9	77.8	86.6	96.2	493.6
PROGRAM RELATED FIXED EXPENSES 9/								
Interest Expense	BPA	15 3	17 1	22 2	24.3	24.5	26 0	129 4
Amortization Expense	BPA	0.1	0.5	0.8	1 1	1 7	2 4	6 6
Depreciation Expense	BPA	4.3	4 5	5 5	5 6	5 7	5 9	31.5
TOTAL PROGRAM FIXED EXPENSES		19.7	22.1	28.5	31	31.9	34.3	167.5
GRAND TOTAL PROGRAM EXPENSES		72.5	139.4	91.4	108.8	118.5	130.5	661.1
FOREGONE REVENUES THRU FY 1993								
Spill (at Federal dams)	BPA	27.0	19.0	9.0	10.0	15.0	15 0	95.0
ESA Drawdown - Minimum Operating Pool 10/	BPA	0 0	0 0	0 0	0.0	0 0	0 0	0 0
		27.0	19.0	9.0	10.0	15.0	15.0	95.0
FOREGONE REVENUES FY 1994 5/								
U Columbia River Water Budget	BPA	—	—	—	—	—	—	—
Spill for Juvenile Passage 6/	BPA	—	—	—	—	—	—	—
Flow Augmentation	BPA	—	—	—	—	—	—	—
Reduced Forebay Levels 10/	BPA	—	—	—	—	—	—	—
ESA - NMFS Fund (Add Spill for Juvenile Passage)	BPA	—	—	—	—	—	—	—
Subtotal								
TOTAL - PROGAM EXP. & FOREGONE REVENUES		99.5	158.4	100.4	118.8	133.5	145.5	756.1

THE ACCOMPANYING NOTES ARE AN INTEGRAL PART OF THIS TABL

FISH AND WILDLIFE CROSSCUT

(dollars in millions)

WORKING DRAFT UPDATED 5/1/96	First Funded by:	FY 1991	FY 1992	FY1993	FY 1994	FY 1995	Subtotal FY 91-95	TABLE 3 TOTAL 78-95
CAPITAL INVESTMENTS								
BPA Fish and Wildlife 1/	BPA	17.7	11 2	17.3	20 5	32.5	99 2	154 3
Associated Projects (Federal Hydro) 2/	COE	12.0	4 7	162 0	63.0	48.0	289 7	614 9
TOTAL CAPITAL INVESTMENTS		29.7	15.9	179.3	83.5	80.5	388.9	769.2
PROGRAM OPERATING EXPENSES								
BPA DIRECT FISH AND WILDLIFE PROGRAM 1/								
Non-ESA Activities	BPA	32.7	59.4	30 0	43.5	47.7	213.3	383 5
ESA Activities	BPA	0.3	7.6	19 6	12.4	23.7	63.6	63.6
Subtotal		33.0	67.0	49 6	55.9	71.4	276.9	447.1
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) THRU FY 1993								
Existing Water Budget 3/	BPA	40 0	40 0	40 0	0 0	0 0	120 0	354
ESA Implementation 4/	BPA	0.0	19.0	64.0	0.0	0.0	83.0	83
Subtotal		40.0	59.0	104 0	0 0	0.0	203.0	437.0
BPA PWR. PURCH. FOR FISH ENHANCE. (NET) EFF. FY 1994 5/								
U. Columbia River Water Budget	BPA	—	—	—	40.0	0 0	—	—
Spill for Juvenile/Adult Passage 6/	BPA	—	—	—	5 7	0 0	—	—
Flow Augmentation 7/	BPA	—	—	—	66.0	0.0	—	—
Reduced Forebay Levels	BPA	—	—	—	0.0	0 0	—	—
ESA - NMFS Fund (Add. Spill for Juvenile Passage)	BPA	—	—	—	0 0	0.0	—	—
Subtotal					111 7	114.0	225.7	225 7
REIMBURSABLE (ASSOC. PROJECTS - FEDERAL HYDRO)								
O&M Lower Snake River Hatcheries	USFWS	8 7	11 2	11.2	12 4	12.7	56.2	100 6
O&M Corps (w/bypass eff. FY 1992)	COE	11.8	13 3	14.0	16.9	17.8	73.8	203.1
O&M Bureau (hatchery eff FY 1992)	BOR	0.0	0.0	1.2	1.3	1.3	3 8	3.8
Other (NW Power Planning Council)	BPA	3 8	3.9	4 1	4 3	4.3	20.4	48.8
Subtotal		24.3	28.4	30 5	34 9	36 1	154.2	356 3
TOTAL PROGRAM OPERATING EXPENSES		97.3	154.4	184.1	202.5	221.5	859.8	1466.1
PROGRAM RELATED FIXED EXPENSES 9/								
Interest Expense	BPA	29.2	31.4	40.6	46.1	44.9	192.2	377
Amortization Expense	BPA	3.6	4.8	5.5	6.8	8.5	29.2	35 8
Depreciation Expense	BPA	5.4	5.7	7 5	8 4	10 2	37.2	91
TOTAL PROGRAM FIXED EXPENSES		38.2	41.9	53.6	61.3	63.6	258.6	503.8
GRAND TOTAL PROGRAM EXPENSES		135.5	196.3	237.7	263.8	285.1	1118.4	1969.9
FOREGONE REVENUES THRU FY 1993								
Spill (at Federal dams)	BPA	15 0	15 0	20.0	—	—	50.0	171
ESA Drawdown - Minimum Operating Pool 10/	BPA	0.0	8.0	25 0	—	—	33 0	33
		15.0	23.0	45.0	0.0	0.0	83.0	204.0
FOREGONE REVENUES FY 1994 5/								
U Columbia River Water Budget	BPA	—	—	—	0.0	—	—	0.0
Spill for Juvenile Passage 6/	BPA	—	—	—	32.0	—	—	0.0
Flow Augmentation	BPA	—	—	—	0.0	—	—	0 0
Reduced Forebay Levels 10/	BPA	—	—	—	25 0	—	—	0 0
ESA - NMFS Fund (Add Spill for Juvenile Passage)	BPA	—	—	—	5.0	—	—	0.0
Subtotal					62.0	114.0	176.0	176.0
TOTAL - PROGAM EXP. & FOREGONE REVENUES		150.5	219.3	282.7	325.8	399.1	1377.4	2349.9

THE ACCOMPANYING NOTES ARE AN INTEGRAL PART OF THIS TABL

PROGRAM & FINANCING SUMMARY

(in millions of dollars)

Identification Code: 89-4045-0-3-271 — 20-Jan-99

		1998	1999	2000 est.	2001	2002	2003	2004
	Program by activities:							
	Operating expenses:							
0.10	Power Business Line	1,114	1,080	1,083	1,061	913	952	930
0.11	Residential Exchange	75	61	61	46	0	0	0
	Associated Project Costs:							
0.12	Bureau of Reclamation	56	48	46	48	48	49	49
0.13	Corps of Engineers	105	100	101	102	108	112	112
0.14	Colville Settlement	15	15	15	15	16	16	16
0.15	U.S. Fish & Wildlife Service	12	12	14	15	15	16	17
0.16	Planning Council	7	7	7	6	5	5	5
0.17	Fish & Wildlife	105	110	105	105	103	108	109
0.20	Transmission Business Line	184	205	204	209	190	190	190
0.30	Conservation & Energy Efficiency	42	43	43	36	34	32	32
0.40	Interest	434	422	430	457	475	475	484
0.50	Pension and Health Benefits 1/	2	4	6	8	55	35	31
0.60	**Total operating expenses 2/**	**2,151**	**2,107**	**2,115**	**2,108**	**1,962**	**1,988**	**1,975**
	Capital investment:							
1.01	Power Business Line	29	56	79	77	93	87	63
1.02	Transmission Services	120	136	210	219	190	195	171
1.03	Conservation & Energy Efficiency	12	14	1	1	0	0	0
1.04	Fish & Wildlife	27	27	27	27	5	5	5
1.05	Capital Equipment	7	19	15	10	5	5	5
1.06	Capitalized Bond Premiums	37	6	20	5	7	7	6
1.07	**Total Capital Investment 3/**	**232**	**258**	**352**	**339**	**300**	**299**	**250**
2.01	Projects Funded in Advanced	2	25	25	25	25	25	25
10.00	**Total obligations**	**2,385**	**2,390**	**2,492**	**2,472**	**2,287**	**2,312**	**2,250**

1/ Assumes that Bonneville will fully recover, from the sale of electric power and transmission, funds sufficient to cover the full cost of associated Civil Service Retirement System and Post-Retirement Benefits. The full cost of employees working under the Federal Employees Retirement System (FERS) is already fully recovered in Bonneville wholesale electric power and transmission rates.

2/ Reflects expense obligations, not accrued expenses.

3/ Reflects capital obligations, not capital expenditures.

Program and Financing (continued)
(in millions of dollars)

	1998	1999	est. 2000	2001	2002	2003	2004
Financing:							
21.90 Unobligated balance available, start of year: Treasury balance 3/	(424)	(446)	(424)	(424)	(424)	(424)	(424)
24.90 Unobligated balance available, end of year: Treasury balance 3/	446	424	424	424	424	424	424
25.00 Unobligated balance lapsing	0	0	0	0	0	0	0
39.00 **Budget authority (gross)**	**2,407**	**2,368**	**2,492**	**2,472**	**2,287**	**2,312**	**2,250**
Budget Authority:							
67.15 Permanent Authority: Authority to borrow (indefinite) 4/	230	80	172	84	146	126	40
68.00 Spending authority from off-setting collections	2,424	2,452	2,484	2,541	2,379	2,397	2,437
68.47 Portion applied to debt reduction 5/	(247)	(164)	(164)	(153)	(238)	(211)	(227)
68.90 **Spending authority from offsetting collections (adjusted)**	**2,177**	**2,288**	**2,320**	**2,388**	**2,141**	**2,186**	**2,210**
Relation of obligations to outlays:							
71.00 Total obligations	2,384	2,391	2,493	2,471	2,288	2,286	2,224
Obligated balance, start of year:							
72.47 Authority to borrow	30	168	168	200	200	200	200
74.47 Authority to borrow	(168)	(168)	(200)	(200)	(200)	(200)	(200)
87.00 Outlays (gross)	2,246	2,391	2,461	2,471	2,288	2,286	2,224
Adjustments to budget authority and outlays:							
Deductions for offsetting collections:							
88.00 Federal funds	(55)	(90)	(90)	(90)	(90)	(90)	(90)
88.40 Non-Federal sources	(2,369)	(2,362)	(2,394)	(2,451)	(2,289)	(2,307)	(2,347)
88.90 Total, offsetting collections	(2,424)	(2,452)	(2,484)	(2,541)	(2,379)	(2,397)	(2,437)
89.00 **Budget authority (net)**	**(17)**	**(87)**	**8**	**(60)**	**(92)**	**(85)**	**(187)**
90.00 **Outlays (net)**	**(178)**	**(61)**	**(23)**	**(70)**	**(91)**	**(111)**	**(213)**

3/ FY 1997-2003 Treasury balance and unobligated balance estimates assume that BPA will borrow the amount needed to finance the full capital program. Actual Treasury borrowing and cash balances will be different, depending on net revenues, Treasury interest rates, and other cash management factors. Borrowing could be higher such that cash balances at the end of each year could equal total reserves.

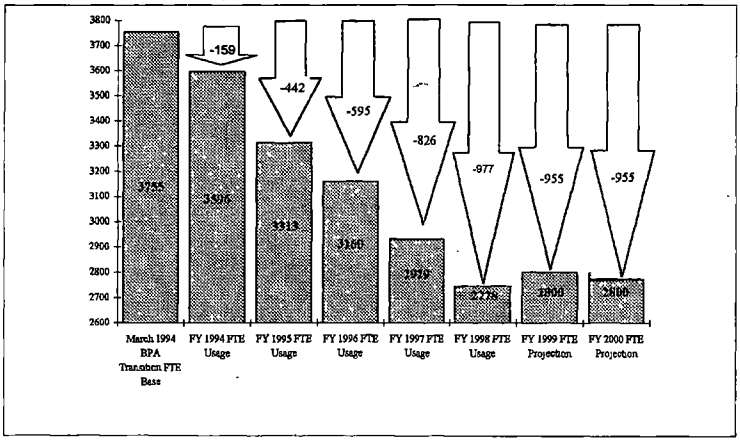
4/ The Permanent Authority: Authority to borrow (indefinite) amount for FYs 1997-2003 reflects both BPA's capital program financing needs and either the use of, or creation of, deferred borrowing. Deferred borrowing is created when, as a cash and debt management decision, BPA uses cash from revenues to liquidate capital obligations in lieu of borrowing, This temporary use of cash on hand instead of borrowed funds creates the ability in future years to borrow money, when fiscally prudent. Technical Executive Branch budget display and tracking requirements have modified the way BPA shows this deferred borrowing as a resource carried forward from year-to-year. This amount must

therefore be added to, or subtracted from, BPA's current year borrowing authority amount, making this number a combination of capital program financing needs and the annual use, or creation of deferred borrowing. The FY 1989 Energy and Water Development Appropriations Act (P.L. 100-371 of 7/19/88) clarified that BPA has authority to incur obligations in excess of borrowing authority and cash in the BPA FundThe two amounts which comprise the net amount on line 67.15 above are as follows:

	FISCAL YEAR						
Borrowing Authority:	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
to finance capital obligations	232	258	352	339	300	299	250
to finance other obligations	(2)	(178)	(180)	(255)	(154)	(173)	(210)
Total Borrowing Authority (67.15)	**230**	**80**	**172**	**84**	**146**	**126**	**40**

5/ Includes amortization of BPA and Corps of Engineers appropriations and amortization of BPA bonds. Line 68.47 is referred to as capital transfers on BP-3.

BONNEVILLE FTE REDUCTION
(Revised December 21, 1998)



BPA's March 1994 baseline for FY 1994 was the number of filled positions (permanent and temporary, full and part-time, including student programs charged against FTE allocations) whose incumbents were actually on board and charging against BPA FTE. BPA identified this as baselines for both employment and FTE.

BPA has utilized the following number of Voluntary Separation Incentives (VSIs): 240 in FY 1994, 192 in FY 1995, 138 in FY 1996, 138 in FY 1997, 100 in FY 1998 and BPA estimates it may be able to use 100 - 130 VSIs in FY 1999.

BPA expects a small FTE increase in FYs 1999 and 2000 as part of it's succession planning efforts, but is planning further reductions over time. BPA has initiated an effort in 1999 to complete a comprehensive multi-year staffing plan for FY 2001 and beyond

DOE/CR-0066

DEPARTMENT OF ENERGY

ANNUAL PERFORMANCE PLAN for FY 2000

SECRETARY OF ENERGY
BILL RICHARDSON

Editor's Notes

This plan addresses three years' performance: status of FY 1998 Performance Agreement commitments, final edits to the FY 1999 performance measures and goals proposed with the FY 1999 budget, and proposed FY 2000 performance measures and goals within DOE's budget request for FY 2000 The significant changes to the FY 1999 performance measures and goals are indicated by striking out ~~text~~ to be removed and underlining text to be added with footnotes explaining the change.

DOE's Inspector General and the Power Marketing Administrations are included in this plan. However, the Federal Energy Regulatory Commission (FERC) has prepared separate GPRA documents and their resources but not performance measures are included in this plan

This plan was prepared by the Office of Policy, Office of Strategic Planning, Budget and Program Evaluation with input from all offices in DOE. The DOE point of contact for this document is Bill Kennedy, (202) 586-0423, bill.kennedy@hq.doe.gov.

This document is available on the World Wide Web as part of the Department's Strategic Management System found at: http://www doe.gov/policy/sms/sms.html

DEPARTMENT OF ENERGY

OVERVIEW

This Annual Performance Plan for the Department of Energy expands on the Clinton Administration's performance plan for FY 2000 and is an overview of the details contained in DOE's full budget submission for FY 2000 This plan is a product of the Department's Strategic Management System's process to make DOE more productive and accountable to the taxpayers.

Fiscal Year 2000 is the third year for which the Department has prepared a performance plan and the second performance plan required by the Government Performance and Results Act of 1993 ("Results Act") The FY 2000 plan was developed using our experience gained from

- developing and using Performance Agreements between the Secretary of Energy and the President since FY 1995,
- reporting the results of those Agreements and receiving "clean opinions" from our Inspector General for two consecutive years,
- developing the "Comprehensive National Energy Strategy" and "Accelerating Cleanup -- Paths to Closure" plan, and
- reviews by Congress and the General Accounting Office of our Results Act implementation

Our Annual Performance Plan includes the results of our commitments for FY 1998, establishes our final performance goals for FY 1999, and proposes performance goals for FY 2000 These are organized to support the "business lines" established by the Department's Strategic Plan Consistent organization and format of performance information clarifies the linkage of management documents from the Strategic Plan to the Annual Performance Plan, to the Secretary of Energy's Performance Agreement with the President, to the Department's annual report

The budget and management of the operations at the Department of Energy are performance-based and follow the business line format outlined in the Department's Strategic Plan This Performance Plan for FY 2000 identifies what the taxpayers will receive for the resources entrusted to the Department of Energy

The Mission of the Department of Energy is:

To foster a secure and reliable energy system that is environmentally and economically sustainable, to be a responsible steward of the Nation's nuclear weapons, to clean up our own facilities, and to support continued United States leadership in science and technology.

To implement this mission, the resources requested for FY 2000 are:

$17.8 Billion and 16,219 Full Time Equivalent staff.

INTRODUCTION

Results for Resources

Our government is becoming more accountable to the taxpayers through implementation of the Government Performance and Results Act of 1993 (the "Results Act") This law requires development of long range strategic plans, annual performance plans, and annual performance reports This document is the second annual performance plan prepared to meet law's requirements of: (1) establishing performance goals that include the level of performance to be achieved written in an objective, quantifiable, and measurable form; (2) briefly describing the resources required to meet those performance goals; (3) describing how performance will be measured and compared with the goals; and (4) describing the how the Department will verify and validate the measured results The President's Office of Management and Budget has issued guidance to agencies for preparing these plans but the format was up to the Departments.

A Clear Picture of Intended Performance

This Annual Performance Plan provides a clear picture of the Department's intended performance for FY 2000 by presenting fiscal year performance goals toward achieving the mission and goals of the Strategic Plan. The annual goals are improved, means and strategies for FY 2000 are more meaningful, and the links to the resources is simpler and clearer To provide context, the plan includes the revised final measures and goals for FY 1999 and the status of the commitments in the Secretary's FY 1998 Performance Agreement with the President.

Consistency with the Strategic Plan and Linkage to the Budget

To ensure consistency with our Strategic Plan, this Annual Performance Plan begins with our mission as stated in the Strategic Plan and follows the Strategic Plan's structure. It describes performance measures and goals for each long term objective of the business lines and corporate management.

We have also made some structural adjustments to improve the linkage between our performance measures and goals and the resource requests In order to show the links between this performance plan and the budget structure, a two-step process is necessary. First is a mapping from the "program activities" of the President's budget to our "decision units." Second is a matrix showing how each decision unit is supported by performance measures and goals. Both steps are presented as tables at the beginning of each business line discussion.

The following shows the relationship between the GPRA-specified contents and terminology of a strategic plan (SP) and annual performance plans (APP) and where they are found in either DOE's Strategic Plan, Annual Performance Plan, or both.

GPRA		At DOE
General Goals (SP)	↔	Business Line Goals (SP&APP)
General Objectives (SP)	↔	Business Line Objectives (SP&APP)
Strategies (SP)	↔	Long-term Strategies (SP&APP)
Performance Goals & Indicators (APP)	↔	Performance Measures & Goals, Commitments (APP)
Means & Strategies(APP)	↔	Means & Strategies (APP)

Organizational Adjustments

To improve linkage with the budget structure, we have presented performance measures and goals with their associated funding source as well as of showing them in the original Strategic Plan business line. This format allows us to be consistent with the budget, yet increase the focus on accountability. For example, the science and technology developmental work done by the Office of Energy Efficiency and Renewable Energy is described under the Energy Resources business line where it is funded, rather than in the Science and Technology business line. Similarly the electric utility restructuring and global climate change work being done by the Policy Office is described under Corporate Management because it is funded by the Departmental Administration account rather than with the Energy Resources business line These adjustments did not affect a significant number of items and all items are indicated in both where they were found in the Strategic Plan, the FY 1998 Performance Agreement, and the FY 1999 Performance Plan, as well as where they are in this Annual Performance Plan for FY 2000.

Adjustments to the Strategic Plan

The Government Performance and Results Act of 1993 allows adjustments to the strategic plan through annual performance plans In the year since the original strategic plan was published in September 1997, two significant strategic planning efforts have been completed In April 1998, the Department published the *Comprehensive National Energy Strategy*. DOE/S-0124 (CNES) Its development included consultation with stakeholders through public meetings and public comments The five "goals" of the resulting plan are different from the five "objectives" in the Strategic Plan's business line for Energy Resources Work continues on implementing the CNES, however, for this version of the Annual Performance Plan, the Strategic Plan's original objectives are used because we have not fully implemented the CNES plan into our strategic plan

The second significant strategic planning effort was the development of the environmental management plan. *Accelerating Cleanup Paths to Closure*, DOE/EM-0362 The development of this plan also involved stakeholders and the public The plan does not change the Strategic Plan but describes in more detail the costs, schedule, and strategies It does, however, effect the budget structure for FY 2000 in that the work has been organized into 353 projects to cleanup the 53 remaining sites *Accelerating Cleanup* is incorporated into this Plan

During the development of the FY 2000 budget, improvements were made to the performance measures and goals of the Strategic Plan based on our experiences with the CNES, the *Accelerating Cleanup* plan, and our experience in developing the performance measures and goals of the FY 1999 Performance Plan In addition, we have been evolving criteria for what performance measures should be included in the Department's performance plan based on our experience with the Performance Agreements between the Secretary and the President since FY 1995 We want performance measures and goals to be presidential, specific, quantified, meaningful, stretching, concise, written for taxpayers, covering, and auditable These criteria are discussed on page104

This annual performance plan contains the resultant set of measures & goals

Management Challenges

Each year, in accordance with the Federal Managers' Financial Integrity Act of 1982 (FMFIA), the Department has been identifying for the President, Congress, and ultimately the public, areas of vulnerability in the operations of Government, and, as a consequence, ensuring that appropriate attention is given to ameliorating problems that may affect wise expenditure of the taxpayer's money The FMFIA process identifies reportable problems and DOE's plans to address them For FY 1999 and FY 2000, we are incorporating those commitments into the performance measures and goals for the Department based on the evaluation done for FY 1998 The ten management challenges are included in their associated business line or corporate management area and are identified as FMFIA items

The Year 2000 Problem

The steps the Department is taking to address this problem are part of the fifth Corporate Management objective on page 99

Crosscutting Goals

The Department conducts continual dialogue and cooperation with other Federal and State agencies, and Native American nations, as well as U.S. industries and foreign governments This cooperation frequently identifies crosscutting or common goals for the Department and the other organizations In situations where our goals and objectives are accomplished through the work of others, we reduce or eliminate our efforts, thus avoiding duplication and saving taxpayer resources. Discussions of specific coordination for each objective are in the "means and strategies" section for the objective

Consultation

In the development of the Department's Strategic Plan, alternative long-term strategies were considered Through consultation with Congress, other agencies, and other stakeholder groups, many strategies were revised and improved, such that the strategies included in the final plan were those most likely to succeed The projected available resources, financial, human, capital, and technological, were considered in developing the goals and objectives. The financial and human resources requested in the budget are identified in the Annual Performance Plan with each goal and objective. However, in accordance with OMB guidance, the annual performance plan,

like the budget, contains pre-decisional information and was not released outside the Executive branch. Consultation with Congress is conducted through the Congressional review of the budget.

Following the submittal of the Performance Plan for FY 1999, several committee chairman wrote the Secretary providing their "grading" of the Department's plan. Those comments were taken into consideration in developing this FY 2000 plan. The Department recognizes that the preparation of this annual performance plan is an inherently governmental function. As such, drafting of the plan was done only by Federal employees and no non-Federal parties made any significant contribution

Addressing Weaknesses in the FY 1999 Plan

The major weaknesses in the FY 1999 plan were the poor linking of the proposed performance with the budget requested, the lack of FY 1999-specific strategies to accomplish the annual goals, and the thin discussion of crosscutting goals These areas have received special attention. Showing the connection from the budget to our performance goals has been improved by the addition of tables providing the linking the President's Program and Financing (P&F) accounts and program activities to DOE's decision units We have retained the tables showing the relationship of DOE's decision units to the Strategic Plan's objectives and the Annual Performance Plan's performance measures and goals. We have also added a new section following the performance measures and goals addressing the FY 2000-specific means and strategies for accomplishing the proposed FY 2000 performance goals Finally, how we are collaborating with other entities to accomplish joint performance goals is stated in the performance measures themselves or in the discussion of the means and strategies to accomplish them Other improvements have been made throughout the document to address other noted weaknesses.

Organization of this Plan

This plan's organization is based on Strategic Plan and it addresses DOE's performance for three years. The Strategic Plan presented a single goal for each of four major business lines and one goal for corporate management. Each of these five goals were supported by objectives that are, in turn, supported by long-term strategies While the goals and objectives chart a course for the next 5-10 years and the Strategic Plan's strategies were targeted for the next 3-5 years, this annual performance plan contains the performance measures and goals for the budget year, FY 2000. Performance measures and goals for the current year, FY 1999 and the status of results for the previous year, FY 1998, are provided for context

The discussion of each business line begins with the goal for a business line, overview charts addressing the general goal, and tables linking the President's budget to the resources applied to the objectives of that business line Next, each objective is presented followed by a listing of the long-term (strategic) strategies and three columns of performance information The columns are by fiscal year: FY 1998, FY 1999, and FY 2000 In the columns are titles derived from the long-term strategies followed by the associated performance measures and goals. Each measure is annotated with the responsible DOE office in parentheses A list of the office abbreviations is provided on page 105.

The FY 1998 results are described using status codes. The status codes are:

"FULLY SUCCESSFUL" for results evaluated as meeting or exceeding the target,
"SUCCESSFUL" for results effectively 80-100 percent of the target,
"PARTIALLY SUCCESSFUL" is used for results effectively in the range of 50-80 percent of target;
and "UNSUCCESSFUL" was used for results effectively less than 50 percent of the target

Where performance was less than SUCCESSFUL, a brief explanation is provided The full discussion of the FY 1998 results will be found in the Department's Accountability Report to be published March 1, 1999.

Following the columns is a discussion of the means and strategies that DOE will use to achieve the FY 2000 performance goals This discussion includes any significant overlap with other organization's performance goals, i e., other government agencies involved in achieving the specified goals.

It should also be noted that this performance plan is only an overview. The comprehensive set of performance measures and performance goals are set forth in the Department's full performance-based budget.

Finally, performance planning is still evolving at the Department of Energy. Each cycle the Department becomes more effective in designing and refining performance measures and goals that are used to manage operations at the Department of Energy.

The following table presents the business line goal statements and requested resources for FY 2000.

Business Line Goals	FY 2000 Budget Request (in millions)	(in FTE)
Energy Resources: The Department of Energy and its partners promote secure, competitive, and environmentally responsible energy systems that serve the needs of the public (FE, EE, NE, PMAs, EIA, & FERC)	$ 2,095	7,575
National Security: Support national security, promote international nuclear safety, and reduce the global danger from weapons of mass destruction (DP, NN, IN, CN, MD, WT, NR)	$ 6,228	2,508
Environmental Quality: Aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the Nation's radioactive wastes. (EM, RW, & EH)	$ 6,452	3,232
Science and Technology: Deliver the scientific understanding and technological innovations that are critical to the success of DOE's mission and the Nation's science base (SC)	$ 2,844	424
Corporate Management: The Department of Energy continuously demonstrates organizational excellence in its environment, safety and health practices, communication and trust efforts, and its corporate management systems and approaches (All programs participate in the Corporate Management area The funds and FTEs shown for Corporate Management are those of the Departmental Administration account with FERC receipts) (CFO, CI, GC, ED, FM, GC, HG, MA, IG, PA, PO, PC, & SI)	$ 223	2,480
Totals:	**$17,842**	**16,219**

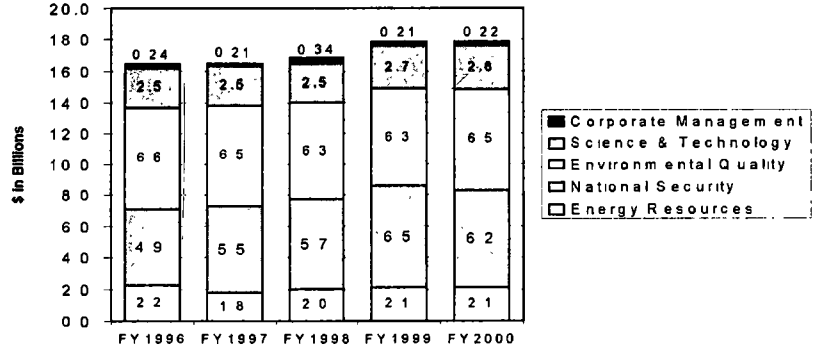


Figure 1. Department of Energy Budget Requests by Business Line

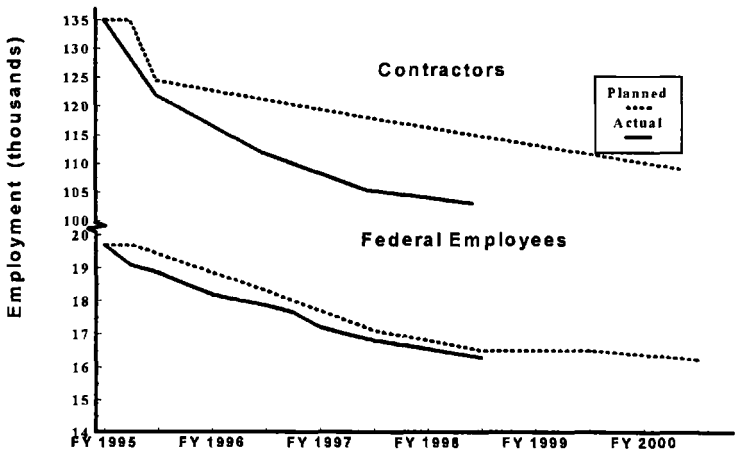


Figure 2 DOE's Human Resources (includes PMAs and FERC)

ENERGY RESOURCES

GOAL: The Department of Energy and its partners promote secure, competitive, and environmentally responsible energy systems that serve the needs of the public.

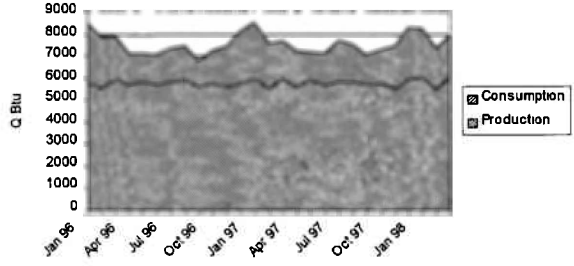


Figure 3: Energy Production & Consumption

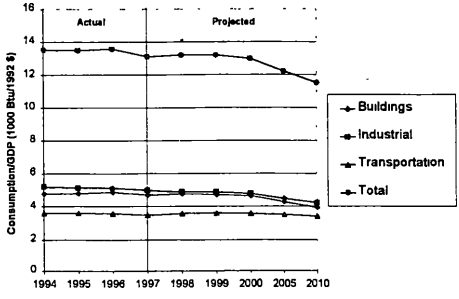


Figure 4. The Costs of Energy by Sector

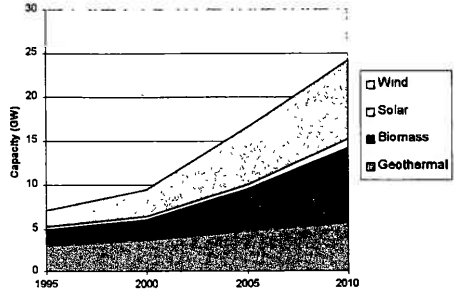


Figure 5: Renewable Energy Capacity

The following table maps the Presidential Budget's Program and Financing (P&F) accounts and program activities to the Department of Energy's offices and decision units The alignment includes aggregation, disaggregation, and consolidation. The table that follows this one maps DOE decision units to the business line objectives where performance measures and goals are identified.

Presidential Budget Program and Financing (P&F) Accounts and Program Activities	***FY 2000 Budget Request ($M)***	***DOE Office***	***DOE Decision Units***
270 Energy Supply			
Solar and renewable energy	$399	EE	Solar & Renewable Energy
Nuclear research & development	$269	NE	Nuclear Energy
Fossil Energy Research and Development	$375	FE	Fossil Energy Programs
Naval Petroleum and Oil Shale Reserves	$0	FE	Naval Petroleum & Oil Reserves
Energy Conservation			
Building technology, State and community programs--non-grant	$145	EE	Building technology, State and community programs--non-grant
Building technology, State and community programs--grant	$191	EE	Building technology, State and community programs--grant
Federal energy management program	$32	EE	Federal Energy Management Program
Industrial sector	$171	EE	Industrial Sector
Transportation sector	$252	EE	Transportation Sector
Policy and management	$47	EE	Policy and management
Strategic Petroleum Reserve	$159	FE	SPR Facilities Development
SPR Petroleum Account	$5	FE	SPR Petroleum Account
Energy Information Administration	$73	EIA	Energy Information Administration
Clean Coal Technology	--$246	FE	Clean Coal Technology
Elk Hills School Lands Fund	$36	FE	Elk Hills School Lands Fund
Power Marketing Administrations	$319	PMA	Power Marketing Administrations
Departmental Administration [1]	$21	PO	Policy and International Affairs

[1] Only a portion of Departmental Administration resources are applied to the Energy Resources Business Line

The following table indicates which budget program/decision units support which of the business line objectives Resources, in both funds and Full Time Equivalent staff (FTEs), are shown. FTE estimates are for the overall program offices. The funds shown are program totals from DOE's budget request.

DOE Office	DOE Program/ Decision Units	FY 2000 Budget Request ($M)	FTEs	ER-1 Energy Security	ER-2 Competitive Industry	ER-3 Efficiency & Productivity	ER-4 Global Markets	ER-5 Informed Policy
EE	Solar & Renewable Energy	$399	526	X	X	X	X	X
	Transportation Sector	$252		X		X	X	
	Industry Sector	$171			X	X	X	
	Federal Energy Management Program	$32			X	X		
	Building technology, State and community programs--non-grant	$145			X	X	X	
	Building technology, State and community programs--grant	$191				X		
	Policy and Management	$47		X	X	X	X	X
FE	Fossil Energy Programs	$364	905	X	X		X	X
	Clean Coal Tech.	--$246		X	X		X	
	Naval Petroleum & Oil Reserves	$0		X				
	SPR Facilities Development	$164		X				
	Elk Hills School Lands Fund	$36		X				
NE	Nuclear Energy	$269	144		X			
PMA	Power Marketing Administrations	$200	4,309	X				
HG	Hearings and Appeals	$6	46		X			
EIA	Energy Information Administration	$73	371					X
PO	Office of Policy and International Affairs [2]	$21	120	X	X		X	

[2] Only a portion of the Policy Office's resources are applied to the Energy Resources Business Line

ER-1 Reduce the vulnerability of the U.S. economy to disruptions in energy supplies. (FE, EE, PMAs)

Long-term Strategies: Over the next several years, the Department will (1) support research and development, policies, and improved regulatory practices capable of ending the decline in domestic oil production before 2005, (2) maintain an effective Strategic Petroleum Reserve (SPR) to deter and respond to oil supply disruptions, and act cooperatively with member nations of the International Energy Agency; (3) diversify the international supply of oil and gas, (4) develop alternative transportation fuels and more efficient vehicles that can reduce year 2010 projected oil (crude plus refined products) imports of 12 million barrels per day by 10 percent; (5) maximize the productivity of Federal oil fields, consistent with Congressional legislation, and (6) take measures to avoid, but when needed, respond to domestic energy disruptions

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals (Initial)
ER1-1 BOOSTING THE NATION'S PRODUCTION OF DOMESTIC OIL • *Demonstrating advanced production enhancement technologies for shallow-shelf carbonate reservoirs, adding 27 million barrels of reserves (FE)* (FULLY SUCCESSFUL)[3] • *Developing and transferring to industry six new technologies to characterize the heterogeneity in naturally fractured reservoirs. (FE)* (FULLY SUCCESSFUL) • *Completing work in four States, giving them the capability to establish variances for oil and gas injection wells in areas of low environmental risk, and implementing risk-based data management systems for improved regulatory decision- making in ten States, towards overall program objective of reducing cumulative industry compliance costs by $16 billion by 2010 (FE)* (FULLY SUCCESSFUL)	**ER1-1 BOOSTING THE NATION'S PRODUCTION OF DOMESTIC OIL** • *Demonstrate four advanced production enhancement technologies that could ultimately add 190 million barrels of domestic reserves, including 30 million barrels during FY 1999. (FE)* • *Complete an online environmental compliance expert system, developed in cooperation with States, that will improve oil and gas production economics by giving producers on-line access to Federal and State rules and regulations and allowing them to conduct environmental permitting and reporting over the Internet, reducing time and costs related to environmental compliance (FE)*	**ER1-1 BOOSTING THE NATION'S PRODUCTION OF DOMESTIC OIL** • *Completing demonstration and transfer of seven advanced secondary and tertiary technologies, adding 92 million barrels of reserves, increasing the number of economic wells and reducing abandonment rates. (FE)* • *Completing field testing and monitoring of two technologies for downhole separation for oil and water, resulting in reduction in produced water and potential increase in oil production per well. (FE)*

[3] End-of-year results of FY 1998 Performance Agreement commitments are classified as "FULLY SUCCESSFUL", "SUCCESSFUL", "PARTIALLY SUCCESSFUL", or "UNSUCCESSFUL" for performance judged to be effectively 100% or better, 80-100%, 50-80%, or less than 50% respectively

ER-1 Reduce the vulnerability of the U.S. economy to disruptions in energy supplies. (FE, EE, PMAs) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER1-2 MAINTAINING AN EFFECTIVE STRATEGIC PETROLEUM RESERVE • *Degassing 11 million barrels of additional oil inventory to complete the degasification effort at a total of 169 million barrels, thus increasing oil availability for drawdown to the total SPR inventory amount (FE)* (FULLY SUCCESSFUL) • *Performing an annual assessment of commercial systems' capability to distribute SPR crude into the marketplace, defined as 120 percent of SPR drawdown rate capability. (FE)* (FULLY SUCCESSFUL) • *Initiating an additional 17 percent of the infrastructure life extension program to maintain SPR systems' reliability, bringing implementation to 93 percent. (FE)* (FULLY SUCCESSFUL)	**ER1-2 MAINTAINING AN EFFECTIVE STRATEGIC PETROLEUM RESERVE** • *Initiate additional SPR infrastructure Life Extension Program projects, thereby bringing program implementation to approximately 96 percent of the $328 million program Program completion in FY 2000 will increase sustained drawdown capability to 4 1 million barrels per day compared to 3.7 in FY 1997 (FE)*	**ER1-2 MAINTAINING AN EFFECTIVE STRATEGIC PETROLEUM RESERVE** • *Complete the Life Extension Program to ensure the long-term reliability, effectiveness, and operational readiness of SPR facilities and systems (FE)* • *Ensuring achievement of a calculated site availability of 95% or greater with drawdown capability of 4 1 million barrels per day for a sustained 90 day period within 15 days notice by the President (FE)*
ER1-3 DIVERSIFYING THE INTERNATIONAL SUPPLY OF OIL AND GAS • *Continuing DOE leadership in international energy initiatives that are instrumental in developing, through government-to-government efforts, an effective legal and regulatory framework for private sector energy investment and policies to encourage development of a broad portfolio of fuel supplies (PO)* (FULLY SUCCESSFUL)	**ER1-3 DIVERSIFYING THE INTERNATIONAL SUPPLY OF OIL AND GAS** • *Continue DOE leadership in international energy initiatives that are instrumental in developing, through government-to-government efforts, an effective legal and regulatory framework for private sector energy investment and policies to encourage development of a broad portfolio of fuel supplies. (PO)*	**ER1-3 DIVERSIFYING THE INTERNATIONAL SUPPLY OF OIL AND GAS** • *Continue DOE leadership in international energy initiatives that are instrumental in developing, through government-to- government efforts, an effective legal and regulatory framework for private sector energy investment and policies to encourage development of a broad portfolio of fuel supplies (PO)*

ER-1 Reduce the vulnerability of the U.S. economy to disruptions in energy supplies. (FE, EE, PMAs) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER1-4 DEVELOPING ALTERNATIVE TRANSPORTATION FUELS AND MORE EFFICIENT VEHICLES • *Developing technologies to convert fossil and waste fuels to high quality transportation fuels at costs of $20-$25 per barrel. Specifically, (FE/EE)* - *developing a conceptual process design for oxygen separation using a new type of ceramic membrane to advance Fischer-Tropsch technology for conversion of remote low-valued natural gas to high quality alternate liquid transportation fuels, and* - *initiating development of catalysts for coproducing chemical feedstocks and premium, ultra low emission diesel fuels from solid carbonaceous feedstocks* (SUCCESSFUL) • *Expanding the Clean Cities program to more than 65 participating communities. (EE)* (SUCCESSFUL) • *Completing the design of a 10 million gallons of ethanol per year first-of-a-kind refinery for producing ethanol from agricultural crop waste. (EE)* (SUCCESSFUL) • *Completing initial performance specifications for the high efficiency diesel to replace current low efficiency engines in class 1 and 2 trucks. (EE)* (SUCCESSFUL) • *Maintaining our 600+ existing Climate Challenge partnership agreements supporting integration of energy efficiency and renewable energy technologies into our partner's Carbon abatement programs. (EE)* <moved from ER4-1> (FULLY SUCCESSFUL)	**ER1-4 DEVELOPING ALTERNATIVE TRANSPORTATION FUELS AND MORE EFFICIENT VEHICLES** • *Support an industrial partner to complete site preparation and begin construction of industry-owned facility to demonstrate first-of-a-kind cellulosic biomass to ethanol technology from agricultural crop waste. (EE)* • *Build a single cylinder proof-of-concept diesel engine that delivers up to 55 percent efficiency. (EE)* • *Expand the Clean Cities program to create continuous corridors of alternative transportation fuel availability in and between 10 major urban centers (EE)* <moved from ER3>	**ER1-4 DEVELOPING ALTERNATIVE TRANSPORTATION FUELS AND MORE EFFICIENT VEHICLES** • *Demonstrate conversion of agricultural wastes to ethanol at a small commercial scale using a genetically engineered fermentative microorganism (EE)* • *Complete testing of baseline prototype, 50-volt high power lithium-ion modules for use in hybrid vehicles (EE)* • *Launch two projects that will lead to 100 percent penetration of alternative fuel vehicles in selected niche applications such as a local taxi fleet or the busses for a particular school. (EE)*

ER-1 Reduce the vulnerability of the U.S. economy to disruptions in energy supplies. (FE, EE, PMAs) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER1-5 MAXIMIZING THE PRODUCTIVITY OF FEDERAL OIL FIELDS	**ER1-5 MAXIMIZING THE PRODUCTIVITY OF FEDERAL OIL FIELDS**	ER1-5 [Combined with ER1-4]
• *Carrying out the sale of the Elk Hills oil field at maximum market value by February 1998. (FE)* (FULLY SUCCESSFUL)	• ~~*Complete negotiations with Chevron USA on equity shares of Elk Hills. (FE)*~~ [4]	
ER1-6 TAKING MEASURES TO AVOID DOMESTIC ENERGY DISRUPTIONS	**ER1-6 TAKING MEASURES TO AVOID DOMESTIC ENERGY DISRUPTIONS**	**ER1-6 TAKING MEASURES TO AVOID DOMESTIC ENERGY DISRUPTIONS**
• *Ensuring that each power system control area operated by a Power Marketing Administration receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North American Electric Reliability Council performance standard. (PMAs)* (FULLY SUCCESSFUL)	• *Ensure that each power system control area operated by a Power Marketing Administration (PMA) receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North America Electric Reliability Council performance standard (PMAs)*	• *Ensure that each power system control area operated by a Power Marketing Administration (PMA) receives, for each month of the fiscal year, a Control Compliance Rating of "Pass" using the North America Electric Reliability Council performance standard (PMAs)*
• *Completing the development of a modeling capability and performing analyses to guide the design of legislative options regarding reliability under electric utility restructuring. (PO)* (SUCCESSFUL)	• *Work with industry organizations and government agencies to establish a comprehensive process to assess Y2K readiness status, promote intersectoral coordination, and provide contingency plans. Provide for timely communication to the public of information regarding readiness status and contingency planning activities. (PO)* [5]	• *Meet the repayment plan for the principal on the Power Investment for each PMA. (PMAs)*
	• *Work with industry organizations and government agencies, including the National Petroleum Council, to assess the impact of changing market conditions and regulations on the level and variability of petroleum prices and supply, and provide recommendations to minimize disruptions during change. (PO)*	• *Achieve a safety performance of a 3.3 recordable accident frequency rate for recordable injuries per 200,000 hours worked or the Bureau of Labor Statistics' industry rate, whichever is lower. (PMAs)*
		• *Work with industry organizations and government agencies, including the National Petroleum Council, to assess the impact of changing market conditions and regulations on the level and variability of petroleum prices and supply, and provide recommendations to minimize disruptions during change (PO)*

[4] There have been a number of new events not under DOE control that have occurred since this measure was developed, which have combined to a considerable delay in the final decision until as late as mid-FY 2002 based primarily on requests from Chevron.

[5] A new responsibility assigned to the Department of Energy and the Policy Office for FY 1999.

Means & Strategies for FY 2000: With the Life Extension program wrapping up in FY 2000, DOE will focus the Strategic Petroleum Reserve (SPR) efforts on maintaining operational readiness of SPR facilities within 15 days of notice by the President to drawdown oil at set performance levels Oil supply activities will include increased technology transfer to help meet the CNES strategy: "By 2005, stop the decline in domestic oil production " The Naval Petroleum and Oil Shale Reserves will continue efforts to achieve maximum value from existing properties." The Department will improve the efficiency of vehicles through joint R&D with automobile manufacturers, demonstrate cost competitive technologies for the production of liquid transportation fuels through partnerships with biofuel manufacturers, and encourage the adoption of alternative fuel vehicles and supporting infrastructures through partnerships with local government organizations.

To meet their repayment target, the PMAs will emphasize: (a) managing costs and FTE; (b) risk management, (c) enhancing revenues (e.g.., BPA's renewal of power sales contracts through 2001 with existing wholesale customers), and (d) effectively operate in the increasingly competitive marketplace.

To meet their safety target the PMAs will emphasize: (a) continuing to provide training for managers, supervisors and staff; (b) tracking and reviewing injury/illness history to mitigate further occurrences; (c) continuing to monitor safety compliance; and (d) emphasizing the role of management in safety

To meet their reliability target the PMAs will emphasize· (a) being Y2K-ready; (b) leadership roles in adoption of mandatory reliability requirements; (c) improved operations (e.g , reliability-centered maintenance, adopting quality assurance approaches), and (d) improved contingency planning (e.g., outage coordination, remedial action schemes).

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE)

Long-term Strategies: Over the next several years, the Department will (1) propose legislation and support administrative actions to promote establishment of a more open, competitive electric system, with improved environmental performance, (2) support R&D policies and improved regulatory practices that can increase domestic natural gas supplies, moderate future price increases, and fuel 25 percent of the anticipated 6 trillion cubic feet (TCF) increase in natural gas demand (of which 3 5 TCF is for electricity generation) through 2010, (3) develop renewable energy technologies and supporting policies capable of doubling non-hydroelectric renewable energy generating capacity by 2010, (4) by 2010, significantly reduce emissions from currently existing fossil fuel powerplants, (5) by 2010, integrate advanced turbine and fuel cell technology to achieve market-ready gas-fueled powerplants with efficiencies over 70 percent and significantly reduced NOx compared to conventional plants, (6) by 2010, reduce coal powerplant emissions by achieving market-ready coal power systems with efficiencies over 60 percent (new plants are currently about 35 percent), emission reductions less than 1/10 of New Source Performance Standards (NSPS), and CO_2 emissions 45 percent below conventional plants', (7) improve nuclear power plant reliability and availability to increase the capacity factor of existing nuclear power plants from the 1996 average of 76 percent to 85 percent by 2010, (8) maintain a viable nuclear option for future, carbon-free baseload electricity through cooperative programs with the U S electric utility industry, national laboratories, and universities that would maintain domestic nuclear capabilities and would result in a U S order of an advanced nuclear power plant before 2010 (See EQ-5 for nuclear waste issues), and (9) develop and introduce advanced turbines for cogeneration that can reduce annual industrial energy costs by $500 million and carbon emissions by nearly 1 7 million metric tons in 2010

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER2-1 ESTABLISHING A MORE OPEN, COMPETITIVE ELECTRIC SYSTEM • *Completing the development of a modeling capability and performing analyses to guide the design of legislative options regarding electric industry competitiveness, environmental performance, and affordable customer service (PO)* (FULLY SUCCESSFUL)	**ER2-1 ESTABLISHING A MORE OPEN, COMPETITIVE ELECTRIC SYSTEM** • *Issue a revised Administration proposal on electric utility restructuring and the supporting economic analysis to provide a catalyst for consensus and action (PO)* • *Enhance electricity sector modeling capabilities by benchmarking the representation of transmission system constraints against models of physical power flows to better address electric reliability and economic issues, and use this enhanced modeling capability in support of the legislative process (PO)*	
ER2-2 BOOSTING THE NATION'S PRODUCTION OF NATURAL GAS • *Demonstrating 3 advanced drilling and well completion technology systems that could contribute an additional 6 TCF to domestic gas reserves. (FE)* (FULLY SUCCESSFUL) • *Conducting feasibility studies and developing conceptual designs for alternative storage technologies for the power generation markets in the Northeast and South Atlantic regions (FE)* (SUCCESSFUL)	**ER2-2 BOOSTING THE NATION'S PRODUCTION OF NATURAL GAS** • *Complete development of one Advanced Drilling, Completion & Simulation technology system that could contribute to an additional 6 TCF of domestic gas reserves by 2010. (FE)*	**ER2-2 BOOSTING THE NATION'S PRODUCTION OF NATURAL GAS** • *Demonstrate a cost effective horizontal well and advanced exploration and stimulation technologies in low permeability natural gas formations for increasing recovery of the 5,000+ TCF resource in the Greater Green River and Wind River Basins. (FE)*

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER2-3 DEVELOPING RENEWABLE DOMESTIC ENERGY • *Initiating the government, industry, and state partnership to put solar panels on one million roofs. (EE)* (FULLY SUCCESSFUL) • *Achieving retail sales by U S industry of 8 percent efficient cadmium telluride large area photovoltaic modules (EE)* (FULLY SUCCESSFUL) • *Completing 100-hour acceptance test for Solar Two power tower in California, achieving 90% system availability and producing 1,500 MW-hours of electricity for a one-month period. (EE)* (SUCCESSFUL) • *Completing gas analysis and operational testing of the Vermont biomass gasifier. (EE)* (PARTIALLY SUCCESSFUL. Testing was not completed) • *Beginning construction of multi-megawatt geothermal demonstration power plant based on advanced heat recuperation technology. (EE)* (PARTIALLY SUCCESSFUL. Evaluating comments from draft Environmental Assessment causing delay) • *Completing requirements for International Standards Organization accreditation for wind turbine certification testing at the National Wind Technology Center. (EE)* (FULLY SUCCESSFUL)	**ER2-3 DEVELOPING RENEWABLE DOMESTIC ENERGY** • *Support the Million Solar Roofs Initiative by installing 15,000 energy systems. (EE)* • *Develop codes, standards and safety specifications for residential PV roof systems. (EE)* • *Accumulate 750 hours of reliable operation for a distributed concentrating solar power system. (EE)* • *Complete design of power plant modifications for co-firing of biomass with coal. (EE)* • *Establish a United States based commercial firm as an internationally recognized certification agent using testing and design review services provided by the National Wind Technology Center. (EE)*	**ER2-3 DEVELOPING RENEWABLE DOMESTIC ENERGY** • *Facilitate the installation of 26,000 solar energy systems in support of the Million Solar Roofs Initiative, bringing the total number of installed systems to 51,000 (EE)* • *Develop a 13 percent efficient stable prototype thin-film photovoltaic module (EE)* • *Complete solar Two Power Tower project, demonstrating the dispatchability of solar power during periods of peak demand (EE)* • *Complete three projects which will be co-firing with biomass on a regular basis. (EE)* • *Complete construction of a 5MW Kalina Cycle (advanced heat recuperation technology) demonstration geothermal power plant. (EE)* • *Install three prototypes for field testing under the Small Wind Turbine Project. (EE)*

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Increasing the routine use of renewable energy technologies at Federal facilities through the completion of one government-wide solar technology Super-Energy Savings Performance Contract (Super ESPC);assisting ten sites in assessing renewable potential; and, completing two model delivery orders integrating cost-effective solar technology and energy efficiency. (EE)* (FULLY SUCCESSFUL)	• *Complete three nationwide solar technology Super-ESPCs for use by all agencies. (EE)*	• *Complete three additional nationwide technology Super-ESPCs for us be all agencies, bringing the total number of technology Super-ESPCs to nine. (EE)*
ER2-4 REDUCING EMISSIONS FROM EXISTING FOSSIL FUEL POWER PLANTS AND DEVELOPING CLEAN HIGH EFFICIENCY FOSSIL FUELED POWER PLANT FOR THE 21ST CENTURY	**ER2-4 REDUCING EMISSIONS FROM EXISTING FOSSIL FUEL POWER PLANTS AND DEVELOPING CLEAN HIGH EFFICIENCY FOSSIL FUELED POWER PLANT FOR THE 21ST CENTURY**	**ER2-4 REDUCING EMISSIONS FROM EXISTING FOSSIL FUEL POWER PLANTS AND DEVELOPING CLEAN HIGH EFFICIENCY FOSSIL FUELED POWER PLANT FOR THE 21ST CENTURY**
• *Completing milestones, including initiation of gasification testing and completion of the pressurized fluidized bed combustion (PFBC) test module, at the Wilsonville, AL, Power Systems Development Facility, leading to development of advanced integrated gasification combined cycle (IGCC)and PFBC systems with efficiencies over 60 percent, 30-50 percent lower CO2 emissions, and up to 20 percent lower electricity costs. (FE)* (SUCCESSFUL)	• *Complete testing of the first commercial-sized fuel cell module (100 KWe) using high temperature solid oxide technology suitable for advanced high-efficiency electrical generation cycles. (FE)* • *Complete full-scale component testing of two advanced, utility-scale turbines with over 60 percent efficiency when used in combined cycles (new plants are currently about 55 percent) and with ultra-low NOx emissions. Initiate advanced gas turbine full speed, no load testing with one gas turbine manufacturer.(FE)*	• *Begin testing of first market prototype solid oxide fuel cell on commercial sites for distributed power applications. (FE)* • *Complete validation testing for critical components of advanced utility-scale turbines with over 60 percent efficiency (combined cycles mode) and ultra-low NOx emissions. Initiate advanced gas turbine full speed, no load testing with the second gas turbine manufacturer, which is the last step before demonstration. (FE)* • *In support of Vision 21, deliver a 1-MW fuel cell/turbine hybrid powerplant to verify market entry design. (FE)*

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Continuing accomplishments in the Clean Coal Technology Demonstration Program, including:* – *Initiating the design of one commercial-scale Circulating Atmospheric Fluidized Bed Combustion Project (Jacksonville) and one Advanced Circulating Pressurized Fluidized Bed Project (Lakeland) capable of achieving SO_2 reductions of at least 95 percent and NOx reductions of at least 80 percent* – *Commencing construction of a Coal-fired Diesel Engine Project for small utility and industrial applications.* – *Completing operations of a processing facility producing a coal product fuel with a sulfur content as low as 0.3 percent and heating value up to 12,000 BTU/lb.* – *Commencing operations of commercial-scale, advanced combustor facility (Healy) for electrical power generation with reductions greater than 70 and 90 percent, respectively, for NOx and SO_2.* (SUCCESSFUL)	• *Complete commercial demonstration of one integrated gasification combined cycle project (Wabash) and continue operations of two other gasification projects in order to establish the engineering foundation leading to new generation of 60 percent efficient, ultraclean, coal powerplants. (FE)* • *Complete review of proposals for the second round in FY 1999, and initiate projects to design and develop advanced catalysts, electrodes, and membranes, as well as advanced separator plates and high temperature sealants under the Russian-American Fuel Cell Consortium. (PO)*	• *Complete demonstration of the third integrated gasification combined cycle project (Pinion Pine) utilizing air-blown gasification and hot gas cleanup for improved thermal efficiency, and continue operations of one other project (Polk) in order to establish the engineering foundation leading to new generation of 60 percent efficient powerplants. (FE)*

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Completing the scheduled test runs of the first complete natural gas fueled solid oxide fuel cell power plant, and continuing the product improvement and cost reduction of molten carbonate fuel cell power plants leading to 60 percent efficient systems that will be market-ready in the year 2002 time frame and capable of achieving competitive costs in distributed power generation. (FE)* (FULLY SUCCESSFUL) • *Completing Phase III Advanced Turbine System technology readiness testing for utility-scale turbines, and initiating prototype tests of a 60 percent efficient, ultra-low NOx emissions advanced gas turbine system for market applications in the year 2000 time frame (FE)* (SUCCESSFUL)		
ER2-5&6 [Combined with ER2-4]	**ER2-5&6** [Combined with ER2-4]	**ER2-5&6** [Combined with ER2-4]

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER2-7 IMPROVING EXISTING NUCLEAR POWER PLANTS AND MAINTAINING NUCLEAR POWER AS A VIABLE OPTION FOR THE FUTURE • *Working with industry to facilitate NRC final design approval of the Westinghouse AP600 design by September 1998 for passively safe nuclear reactors. (NE)* (FULLY SUCCESSFUL) **ER2-8** [Combined with ER2-7]	**ER2-7 IMPROVING EXISTING NUCLEAR POWER PLANTS** • *Complete Memorandums of Understanding with the Nuclear Regulatory Commission and the Electric Power Research Institute (EPRI) to guide future implementation of the Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants. (NE)* **ER2-8 MAINTAINING NUCLEAR POWER AS A VIABLE OPTION FOR THE FUTURE** • *Establish a peer-reviewed Nuclear Energy Research Initiative, initially funded at $19 million to select and conduct investigator-initiated innovative scientific and engineering research that will address the issues facing the future of nuclear power in the U.S., including proliferation concerns, economics, and the management of nuclear waste. (NE)*	**ER2-7 IMPROVING EXISTING NUCLEAR POWER PLANTS** • *Implement a cooperative R&D program to address technical questions that could prevent continued operation of current nuclear power plants by working with industry, universities, and national laboratories. (NE)* **ER2-8 MAINTAINING NUCLEAR POWER AS A VIABLE OPTION FOR THE FUTURE** • *Improve the understanding of reactor systems, component technology and nuclear fuel performance so one or more new reactor and one or more new fuel cycle concepts are identified which offer improved proliferation resistance, and the prospects of improved performance and efficiency, lower costs, and enhanced safety. (NE)* • *Identify one or more proliferation resistant reactor concepts for low power and/or modular design applications. (NE)* • *Advance the state of scientific knowledge and technology to enable incorporation of improved proliferation resistance in the design, development, and deployment of new reactor and nuclear fuel systems (NE)*

ER-2 Ensure that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact. (FE, EE, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER2-9 DEVELOPING ADVANCED TURBINES FOR COGENERATION • *Field testing of ceramic components for an advanced industrial turbine for 4,000 hours. (EE)* (SUCCESSFUL)	**ER2-9 DEVELOPING ADVANCED TURBINES FOR COGENERATION** • *Initiate the 8,000 hour test of the gas turbine engine for the Advanced Turbine System for use in industrial cogeneration. (EE)*	**ER2-9 DEVELOPING ADVANCED TURBINES FOR COGENERATION** • *Demonstrate an advanced industrial turbine system engine at one or more sites. (EE)*

Means & Strategies for FY 2000: The Department will focus more attention on recovery from gas resources that can help fuel anticipated large increases in domestic consumption beyond 2010. Increased effort will be given to integrating advanced gas and coal-fueled power technologies into "Vision 21" plants that can enhance environmental and economic performance. The Department will also conduct investigator-initiated, peer-reviewed research and development at universities, national laboratories, and industrial organizations to advance the scientific knowledge base and develop new technologies that will address the principal obstacles to the future use of nuclear energy, and advance the state of nuclear technology for a competitive marketplace. The Department will also conduct government-industry cost-shared, peer-reviewed, research and development to address the issues associated with long-term operation of existing nuclear power plants and to apply new technology to improve plant reliability and availability. This later program will be conducted consistent with the updated Joint DOE-EPRI Strategic Research and Development Plan to Optimize U.S. Nuclear Power Plants to be issued in FY 1999. The Department and NRC have coordinated program planning to assure that their research and development activities are complimentary, cost-effective, and without duplication. The Nuclear Energy Research Advisory Committee (NERAC) will provide the Department advice on the conduct of these research programs with a specific subcommittee on Operating Nuclear Power Plan Research, Coordination, and Planning.to provide advice and prioritize the research theat the Department will conduct with industry under the NEPO program. The Department will collaborate with national laboratories, industry and universities on research and development that improves the performance and reduces the cost of renewable energy technologies, and foster market penetration of solar technologies through the Million Solar Roofs Initiative and Super-ESPCs.

ER-3 Reduce the energy-related environmental impacts through more efficient energy use. (EE)

Long-term Strategies: Over the next several years, the Department will (1) develop and deploy vehicles, fuels, and systems of the future, contributing significantly to the Partnership for a New Generation of Vehicles (PNGV) to develop, by 2004, prototype mid-sized cars capable of 80 miles per gallon that will reduce NOx and CO_2 emissions by two-thirds compared to today's new car average without compromising safety, comfort, and cost, (2) by 2010, limit energy related releases of CO_2, SOx, NOx, particulates, and other wastes by as much as 5 percent relative to projected emissions by supporting R&D to improve efficiency of the Nation's energy intensive industries; and (3) by 2010, improve the energy efficiency of the existing U S. building stock, and increase the energy efficiency of new homes by 30 percent and other new buildings by 20 percent compared to 1996 average new buildings

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER3-1 DESIGNING AND DELIVERING THE VEHICLES OF THE FUTURE • *Completing laboratory validation tests on hydrogen-fueled 50 kW (full-scale) proton exchange membrane fuel cell propulsion systems that can be tested under automotive drive cycle requirements. (EE)* (SUCCESSFUL)	**ER3-1 DESIGNING AND DELIVERING THE VEHICLES OF THE FUTURE** • *By September 1999, in cooperation with industry and other federal agencies, develop a direct injection power system technical roadmap and a fuel cell power system technical roadmap to integrate fuels and lubricants research and development with development of engine and emissions treatment technologies. (EE)*	**ER3-1 DESIGNING AND DELIVERING THE VEHICLES OF THE FUTURE** • *Work with three domestic automakers to incorporate the most promising Partnership for a New Generation of Vehicles (PNGV) technologies in concept vehicles with up to three times average fuel economy of 1993 Taurus, Lumina and Concorde models (EE)*
ER3-2 IMPROVING EFFICIENCY OF ENERGY INTENSIVE INDUSTRIES • *Initiating work on facilitating a Mining and Agriculture Industry Vision, and facilitating development of selected state-wide Industries of the Future strategies. Roadmaps will be completed in the Aluminum, Chemical, Forest Products, Glass, Metalcasting, and Steel Industries, and will drive the DOE R&D portfolio. (EE)* (FULLY SUCCESSFUL) • *Continuing support for Industrial Assessment Centers operating at 30 participating universities that will conduct approximately 750 combined energy, waste and productivity assessments. (EE)* (SUCCESSFUL)	**ER3-2 IMPROVING EFFICIENCY OF ENERGY INTENSIVE INDUSTRIES** • *Complete roadmaps for six of the major energy intensive industries to achieve each industry vision and start implementing the resulting R&D to achieve up to 25 percent reduction of energy consumption by 2010 (EE)* • ~~*Expand the Clean Cities program to create continuous corridors of alternative transportation fuel availability in and between 10 major urban centers. (EE)*~~ <moved to ER1-4> • *Continue support for Industrial Assessment Centers operating at 30 participating universities that will conduct approximately 750 combined energy, waste and productivity assessments. (EE)*	**ER3-2 IMPROVING EFFICIENCY OF ENERGY INTENSIVE INDUSTRIES** • *Initiate 12 solicitations with industry in support of the Roadmaps developed in the Industries of the Future program. (EE)* • *Establish partnerships with 50 Industries of the Future plants to provide integrated delivery of tools and technical assistance to target motors, steam, compressed air, and combined heat and power system opportunities. (EE)*

ER-3 Reduce the energy-related environmental impacts through more efficient energy use. (EE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER3-3 IMPROVING THE ENERGY EFFICIENCY OF BUILDINGS • *Weatherizing approximately 63,335 low-income homes. (EE)* (SUCCESSFUL) • *Adding windows to the Energy Star product portfolio; doubling the number of retail stores labeling Energy Star appliances to 2,400 nationwide; recruiting four major appliance manufacturers to label Energy Star appliances at the factory; increasing sales of Energy Star appliances by 30 percent over 1997. (EE)* (SUCCESSFUL) • *Recruiting 55 new Rebuild America partnerships to join the program, increasing the total number of Rebuild America communities to 195, representing all 56 states and territories. (EE)* (SUCCESSFUL) • *Building 200 energy efficient homes in partnership with industry. These homes will be designed to save 50% of energy used for heating, cooling, & hot water at no incremental costs. Activities will be coordinated with the public and private Partnership for Advanced Technology in Housing (PATH). (EE)* (SUCCESSFUL)	**ER3-3 IMPROVING THE ENERGY EFFICIENCY OF BUILDINGS** • *Weatherize 67,845 homes, bringing the total number of homes weatherized to 4.7 million. (EE)* • *Work with the Federal Trade Commission to allow manufacturers to add the ENERGY STAR logo to the yellow and black FTC "Energy Guide" label for covered products and recruit an additional 1,500 stores to market ENERGY STAR appliances nationwide. (EE)* • *Recruit 55 additional Rebuild America partnerships. New partners will begin action plans that will result in over 250 million square feet of floor space renovated, reduce annual energy costs by over $90 million and reduce annual carbon emissions by 0.22 million metric tons. (EE)* • *Complete 100 homes through the Building America program bringing the total number of homes completed to 700, and add five new community scale projects for building 1000 additional homes in the next fiscal year. (EE)* • *Maintain an industry cost-share level of over 40 percent, when averaged across all work with industry. (EE)*	**ER3-3 IMPROVING THE ENERGY EFFICIENCY OF BUILDINGS** • *Weatherize 76,900 homes, bringing the total number of homes weatherized to 4.8 million. (EE)* • *Recruit 5 utility partners to promote Energy Star products; an additional 500 retail stores to promote Energy Star products; and 40 window partners to promote Energy Star Windows. (EE)* • *Recruit 50 new Rebuild America Partners, increasing the total number of Rebuild America communities to 330. New partners will begin action plans that will result in over 100 million square feet of floor space renovated, reducing annual energy costs by $28 million and reducing CO_2 emissions by 100 thousand metric tons when local actions are completed in 2003. (EE)* • *In partnership with Building America, develop more than 2,000 highly energy-efficient, environmentally sound, and cost-effective houses and disseminate results to builders of 15,000 other houses through Partnership for Advanced Technology in Housing (PATH). (EE)* • *Achieve 20% Federal building energy reduction compared to 1985 energy use baseline. (EE)*

ER-3 Reduce the energy-related environmental impacts through more efficient energy use. (EE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
	• *Accumulate customer economic savings from past and current Energy Efficiency/Renewable Energy programs exceeding $11 billion. (EE)* • *Develop progress milestones and estimates of energy-related program benefits annually for every Energy Efficiency/Renewable Energy program. Review 25 percent of the milestones and estimated benefits through external peer review each year with a goal of having all milestones and estimated benefits peer-reviewed at least once every four years. (EE)*	

Means & Strategies for FY 2000: The Department will collaborate with the Big Three automobile companies, the Department of Transportation, and the Department of Commerce under the Partnership for a New Generation of Vehicles (PNGV) to conduct R&D that reduces vehicle emission levels, partner with manufacturers in the most energy intensive industries to implement vision roadmaps, and partner with states, retail stores, and other federal agencies to foster deployment of energy efficiency technologies in buildings.

ER-4 Support U.S. energy, environmental, and economic interests in global markets. (EE, FE, PO)

Long-term Strategies: Over the next several years, the Department will (1) develop policies, programs, and information to facilitate energy sector reductions in greenhouse gas emissions; and (2) cooperate with foreign governments and international institutions to develop open energy markets, and facilitate the adoption and export of clean, safe, and efficient energy technologies and energy services.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER4-1 PLANNING FOR ENERGY RELATED GREENHOUSE GAS REDUCTIONS • *Completing a climate change technology strategy in partnership with national laboratories, private industry and top universities as part of the President's Climate Change Technology Initiative to develop path-breaking technologies to address climate change. (PO)* (FULLY SUCCESSFUL.) • ~~*Maintaining our 600+ existing Climate Challenge partnership agreements supporting integration of energy efficiency and renewable energy technologies into our partner's Carbon abatement programs (EE)*~~ <moved to ER1-4> • *Developing and assessing options for implementing the new international agreement proposed at the Kyoto Conference of the Parties to the U.N. Framework Convention on Climate Change by: (PO)* - *Supporting through quantitative analyses and international contacts, Administration efforts to obtain meaningful commitments for reducing greenhouse gas emissions from developing countries.* - *Providing institutional arrangements and technologies for the Monitoring and Verification of treaty compliance under the Framework on Climate Change.* – *Completing assessments of alternative approaches for implementing domestic and international greenhouse gas emissions trading* (SUCCESSFUL)	**ER4-1 PLANNING FOR ENERGY RELATED GREENHOUSE GAS REDUCTIONS** • *Develop a DOE proposal for guidelines for implementing the flexibility mechanisms included in the Kyoto Protocol. (PO)* • *Support through quantitative analysis and international contacts, Administration efforts to obtain meaningful commitments for reducing greenhouse gas emissions from developing countries. (PO)* • *Lead the U.S. Government technology and climate change strategy development and implementation through: (PO)* - *Chairing and expanding the Annex II countries' Climate Technology Initiative which promotes the objectives of the UN Framework Convention on Climate Change (UNFCCC) by fostering international cooperation for accelerated development and diffusion of climate-friendly technologies and practices for all activities and greenhouse gases.* - *Leading and facilitating the development of U.S. positions on technology issues in the climate negotiations including participation in the UNFCCC technology consultation process.*	**ER4-1 PLANNING FOR ENERGY RELATED GREENHOUSE GAS REDUCTIONS** • *Develop a DOE proposal for guidelines for implementing the flexibility mechanisms included in the Kyoto Protocol. (PO)* • *Support through quantitative analysis and international contacts, Administration efforts to obtain meaningful commitments for reducing greenhouse gas emissions from developing countries. (PO)* • *Lead the U.S. Government technology and climate change strategy development and implementation through: (PO)* -- *Chairing and expanding the Annex II countries' Climate Technology Initiative which promotes the objectives of the UN Framework Convention on climate change by fostering international cooperation for accelerated development and diffusion of climate-friendly technologies and practices for all activities and greenhouse gases.* -- *Leading and facilitating the development of U.S. positions on technology issues in the climate negotiations including participation in the UNFCCC technology consultation process.*

ER-4 Support U.S. energy, environmental, and economic interests in global markets. (EE, FE, PO) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER4-2 COOPERATING INTERNATIONALLY TO DEVELOP OPEN ENERGY MARKETS • *Assisting to remove policy, regulatory and fiscal barriers to U.S companies in energy efficiency, renewables, oil and gas, coal bed methane and clean coal technology, and nuclear energy markets, in China, India, Indonesia, the Philippines, Mexico, Venezuela, Argentina, Chile, Brazil, Russia, Ukraine, Caspian countries, South Africa, and in other developing economies. (PO)* (SUCCESSFUL) • *Continuing coordination of the Russian-American Fuel Cell Consortium (RAFCO) which has as one of its primary goals the opening up of the Russian market to U.S. manufactured fuel cells. (PO)* (SUCCESSFUL)	**ER4-2 COOPERATING INTERNATIONALLY TO DEVELOP OPEN ENERGY MARKETS** • *Increase U.S. energy-related business internationally by removing policy, legal and fiscal barriers for U.S companies. In FY 1999 the Department will: (PO)* – *Implement with other APEC economies and the private sector an initiative to promote accelerated investment in natural gas infrastructure and trading networks in the APEC region;* – *Implement the "U.S.-China Energy and Environment Cooperation Initiative" including coordination of interagency effort involving DOE programs, EPA, Commerce and OSTP to promote rural electrification, urban air quality, clean energy sources, and energy efficiency;* – *Lead a regulatory reform initiative to promote economic growth through private investment in environmentally sound energy development and regional integration in Sub-Saharan Africa, including South Africa;* – *Lead a regulatory reform initiative under the Binational Commission to promote adoption by the Russian Government of transparent, fair and consistent regulations in the oil and gas, and power sectors in order to attract investment.*	**ER4-2 COOPERATING INTERNATIONALLY TO DEVELOP OPEN ENERGY MARKETS** • *Increase U.S. energy-related business internationally by removing policy, legal and fiscal barriers for U.S. companies. In FY 1999 the Department will:(PO)* – *Continue to implement with other APEC economies and the private sector an initiative to promote accelerated investment in natural gas infrastructure and trading networks in the APEC region;* – *Implement the "U.S.-China Energy and Environment Cooperation Initiative" including coordination of interagency effort involving DOE programs, EPA, Commerce and OSTP to promote rural electrification, urban air quality, clean energy sources, and energy efficiency;* – *Continue to lead a regulatory reform initiative to promote economic growth through private investment in environmentally sound energy development and regional integration in Sub-Saharan Africa, including South Africa;* – *Continue to lead a regulatory reform initiative under the Binational Commission to promote adoption by the Russian Government of transparent, fair and consistent regulations in the oil and gas, and power sectors in order to attract investment.*

Means & Strategies for FY 2000: The Department will continue work in climate change through studies, international cooperation, and leadership. Work on opening international energy markets will include meetings with other U.S. governmental agencies including EPA, Commerce, and the President's Office of Science and Technology Policy, as well as international energy organizations.

ER-5 Carry out information collection, analysis, and research that will facilitate development of informed positions on long-term energy supply and use alternatives. (EIA, FE, EE)

Long-term Strategies: Over the next several years, the Department will (1) develop and expand public access to energy data, forecasts, analyses, and educational materials; and (2) carry out research and scenario analysis to help identify and understand options that could revolutionize 21st century energy markets.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ER5-1 EXPANDING PUBLIC ACCESS TO ENERGY INFORMATION • *The average number of unique monthly users of the Energy Resources Board Web Sites (Http://www.eren.doe.gov/) will grow at least 20 percent per year through 2003 (from about 70,000 per month in 1996.) (EIA)* (FULLY SUCCESSFUL) • *Publishing domestic and international Annual Energy Outlooks, forecasting future energy supply and consumption through the year 2020. (EIA)* (FULLY SUCCESSFUL) • *Completing by April 1998, for submission to Congress, an initial comprehensive national energy strategy that integrates major Federal government energy-related activities. (PO)* (FULLY SUCCESSFUL) **ER5-2 DEVELOPING INNOVATIVE OPTIONS FOR 21ST CENTURY ENERGY MARKETS** • *Completing analysis of data from test well in Mackenzie Delta to help define the volume and production characteristics of Arctic methane hydrates. (FE)* (FULLY SUCCESSFUL)	**ER5-1 EXPANDING PUBLIC ACCESS TO ENERGY INFORMATION** • *Achieve a growth rate of at least 20 percent per year in the average number of unique monthly users of the Energy Resources Board Web Site (from about 71,000 per month in 1997). (EIA)* • *Publish domestic and international Annual Energy Outlooks forecasting energy supply and consumption through the year 2020. (EIA)* **ER5-2 DEVELOPING INNOVATIVE OPTIONS FOR 21ST CENTURY ENERGY MARKETS** • *Initiate a coordinated, Department-wide program to develop lower-cost, environmentally acceptable technology approaches to carbon capture and sequestration. (FE)* • *Complete preliminary version of gas hydrate seismic model based on field and laboratory data. (FE)* • *Complete scale-up of the Sorbent Enhanced Reformer concept for hydrogen production. (EE)* • ~~*Complete a conceptual design study of an innovative fusion power system and evaluate the next steps as guidance to science and technology research. (ER)*~~ <Moved to ST-1>	**ER5-1 EXPANDING PUBLIC ACCESS TO ENERGY INFORMATION** • *Achieve a growth rate of at least 20 percent per year, through 2002, in the average number of unique monthly users of the Energy Resources Board Web Site (from about 110,000 per month in 1998). (EIA)* • *Publish domestic and international Annual Energy Outlooks forecasting energy supply and consumption through the year 2020. (EIA)* • *Respond to 60,000 inquiries by individuals, small businesses, and state and local government through the Energy Efficiency and Renewable Energy Clearinghouse (EREC). Increase the average monthly hits to 4 million on the Energy Efficiency and Renewable Energy Network (EREN) which provides information on the Internet. (EE)* **ER5-2 DEVELOPING INNOVATIVE OPTIONS FOR 21ST CENTURY ENERGY MARKETS** • *Demonstrate over 90 percent absorption of CO_2 in a sorbent enhanced reformer reactor for hydrogen production. (EE)* • *Identify a site containing gas hydrates suitable for testing the feasibility of methane recovery. (FE)* • *Initiate development of biological CO_2 sequestration by conversion into useful products such as liquid fuels. (FE)*

Means & Strategies for FY 2000: The Department of Energy will continue to educate the public and business on energy efficiency and renewable energy technologies through easily assessable high quality material provided through a telephone clearinghouse and Internet site.

NATIONAL SECURITY

GOAL: Support national security, promote international nuclear safety, and reduce the global danger from weapons of mass destruction.

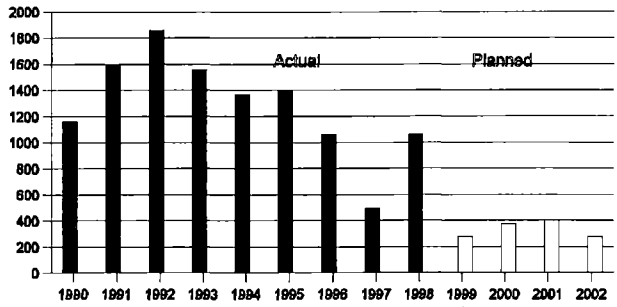


Figure 6: Nuclear Warhead Dismantlement Activity

The following table maps the Presidential Budget's Program and Financing (P&F) accounts and program activities to the Department of Energy's offices and decision units. The alignment includes aggregation, disaggregation, and consolidation The table that follows this one maps DOE decision units to the business line objectives where performance measures and goals are identified.

Presidential Budget Program and Financing (P&F) Accounts and Program Activities	*FY 2000 Budget Request ($M)*	*DOE Office*	*DOE Decision Units*
050 Atomic Energy Defense Activities			
Weapons Activities			
Stockpile stewardship	$2,286	DP	Stockpile Stewardship
Stockpile management	$1,998	DP	Stockpile Management
Program Direction	$247	DP	Program Direction
Other Defense Activities			
Nonproliferation and national security	$748	NN	Nonproliferation and National Security
Fissile materials disposition	$200	MD	Fissile Materials Disposition
Worker and community transition	$30	WT	Worker & Community Transition
Naval reactors	$665	NE(NR)	Naval Reactors
Intelligence	$36	IN	Intelligence
Counterintelligence	$19	CN	Counterintelligence
270 Energy Supply [6]	$269	NE	Nuclear Energy

[6] Only a portion of the Energy Supply resources are applied to the National Security Business Line.

The following table indicates which budget program/decision units support which of the business line objectives Resources, in both funds and Full Time Equivalent staff (FTEs), are shown. FTE estimates are for the overall program offices. The funds shown are program totals from DOE's budget request.

DOE Office	DOE Program/ Decision Unit	FY 2000 Budget Request ($M)	FTEs	NS-1 Stockpile Confidence	NS-2 Science-Based Steward-ship	NS-3 Enterprise Vitality	NS-4 Weapons Reductions	NS-5 Arms Control & Nonpro-liferation	NS-6 Nuclear Power Systems	NS-7 Nuclear Safety
DP	Stockpile Stewardship	$2,286	1,799	X	X	X	X			
	Stockpile Management	$1,998		X		X	X			
	Program Direction	$247				X				
NN	Nonproliferation & National Security	$748	374			X	X	X		X
MD	Fissile Materials Disposition	$200	39			X	X			
NR	Naval Reactors	$665	201						X	
IN	Intelligence	$36	37					X		
CN	Counter-intelligence	$19	36			X		X		
WT	Worker & Community Transition	$30	22			X				
NE	Nuclear Energy, Science & Technology [7]	$269	144				X			

[7] Only a portion of Nuclear Energy resources are applied to the National Security Business Line.

NS-1 Maintain confidence in the safety, reliability, and performance of the nuclear weapons stockpile without nuclear testing. (DP)

Long-term Strategies: Over the next several years, the Department will (1) extend the life of U.S nuclear weapons by continuing the Stockpile Life Extension Program and Stockpile Maintenance activities; (2) improve detection and prediction capabilities for assessing nuclear weapon component performance and the effects of aging; (3) continually evaluate the safety, reliability, and performance of the nuclear weapons stockpile, and (4) provide a reliable source of tritium as required for the nuclear weapons stockpile by FY 2005.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS1-1 MAINTAINING THE ENDURING STOCKPILE • *Certifying the nuclear weapons stockpile safety, reliability, and performance according to DOE/DoD procedures. (DP)* (FULLY SUCCESSFUL)[8] • *Meeting all DoD annual weapons alteration, modification, and surveillance schedules. (DP)* (SUCCESSFUL)	**NS1-1 MAINTAINING THE ENDURING STOCKPILE** • *Report annually to the President on the need or lack of need to resume underground testing to certify the safety and reliability of the nuclear weapons stockpile. (DP)* • *Meet all annual weapons alteration and modification schedules developed jointly by DOE and DoD. (DP)*	**NS1-1 MAINTAINING THE ENDURING STOCKPILE** • *Annually report to the President on the need or lack of need to resume underground testing to certify the safety and reliability of the nuclear weapons stockpile. (DP)* • *Meet all annual weapons alteration and modification schedules developed jointly by DOE and DoD. (DP)* • *Undertake an independent assessment of the Stockpile Stewardship Program and its implementation throughout the DP national security enterprise. (DP)*
NS1-2&3 [Combined with NS1-1]	**NS1-2&3** [Combined with NS1-1]	**NS1-2&3** [Combined with NS1-1]
NS1-4 DEVELOPING A REPLACEMENT SOURCE OF TRITIUM • *Completing the analysis to support the selection by December 1998, of a new production source for tritium. (DP)* (SUCCESSFUL)	**NS1-4 DEVELOPING A REPLACEMENT SOURCE OF TRITIUM** • ~~*Begin the implementation*~~ *Continue development of the dual-path options* ~~*decision to provide a reliable source of tritium as required for the nuclear weapons stockpile.*~~ *and select, by December 1998, a primary tritium production technology.*[9] *(DP)*	**NS1-4 DEVELOPING A REPLACEMENT SOURCE OF TRITIUM** • *Begin implementation of the selected commercial light water reactor technology as a primary technology and the accelerator technology as a backup technology to provide a reliable source of tritium for the nuclear weapons stockpile. (DP)*

[8] End-of-year results of FY 1998 Performance Agreement commitments are classified as "FULLY SUCCESSFUL", "SUCCESSFUL", "PARTIALLY SUCCESSFUL", or "UNSUCCESSFUL" for performance judged to be effectively 100% or better, 80-100%, 50-80%, or less than 50% respectively.

[9] Revised to reflect the Congressional delay in implementing the decision.

Means & Strategies for FY 2000: The Department will conduct a wide range of tests and activities to assess the continuing safety and reliability of the nation's nuclear weapon stockpile. Overall technical reviews by the weapons laboratories of stockpile weapons will encompass laboratory and flight tests of materials and components, surveillance tests, and hydrodynamic testing of components. Calculations and computer simulations of weapons will be used in these assessments. Weapon analyses will utilize data archived from past underground nuclear tests. Working through the weapon production plants and the laboratories, DOE will make deliveries of limited life and other weapon components for nuclear weapon stockpile management and refurbishment according to schedules developed jointly by the DOE and DoD. Studies will be conducted for the Stockpile Readiness and Enduring Stockpile program. Activities will be conducted with the Department of Defense, ranging from training in nuclear weapon field maintenance to partnerships in research supporting non-nuclear munitions. DOE will also begin implementation of selected technology and backup to provide a new tritium source. Construction activities will proceed for the light water reactor technology, and design and development of the accelerator technology backup will complete a preliminary design for an Accelerator Production of Tritium (APT) plant.

NS-2 Replace nuclear testing with a Stockpile Stewardship Program. (DP)

Long-term Strategies: Over the next several years, the Department will (1) develop the advanced simulation, modeling and experimentation technologies necessary to confidently mitigate the loss of underground testing by FY 2004; (2) develop new nuclear weapons physics experimental test capabilities; and (3) advance our understanding of the fundamental characteristics of weapons behavior through systems engineering and advanced experiments and modeling to support future assessments of weapons safety, reliability, and performance.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS2-1 REPLACING UNDERGROUND TESTING WITH SCIENCE	**NS2-1 REPLACING UNDERGROUND TESTING WITH SCIENCE**	**NS2-1 REPLACING UNDERGROUND TESTING WITH SCIENCE**
• *Meeting established schedules for the development and installation of a 3-trillion operations per second computer systems. (DP)* (FULLY SUCCESSFUL)	• *Demonstrate a 3-trillion operations per second computer system. (DP)*	• *Demonstrate a computer code capable of performing a three-dimensional analysis of the dynamic behavior of a nuclear weapon primary, including a prediction of the total explosive yield, on an ASCI computer system. (DP)*
NS2-2 DEVELOPING NEW EXPERIMENTAL CAPABILITIES FOR UNDERSTANDING WEAPONS SCIENCE	**NS2-2 DEVELOPING NEW EXPERIMENTAL CAPABILITIES FOR UNDERSTANDING WEAPONS SCIENCE**	**NS2-2 DEVELOPING NEW EXPERIMENTAL CAPABILITIES FOR UNDERSTANDING WEAPONS SCIENCE**
• *Beginning the physical construction according to schedules in the Project Execution Plan for the National Ignitions Facility(NIF). (DP)* (FULLY SUCCESSFUL)	• *Continue construction of the National Ignition Facility (NIF) according to its Project Execution Plan schedules. (DP)*	• *Continue construction of the National Ignition Facility (NIF) according to its Project Execution Plan schedules. (DP)*
NS2-3 CONDUCTING EXPERIMENTS TO ADVANCE OUR UNDERSTANDING OF WEAPONS BEHAVIOR	**NS2-3 CONDUCTING EXPERIMENTS TO ADVANCE OUR UNDERSTANDING OF WEAPONS BEHAVIOR**	**NS2-3 CONDUCTING EXPERIMENTS TO ADVANCE OUR UNDERSTANDING OF WEAPONS BEHAVIOR**
• *Conducting three or four subcritical experiments to provide information about the behavior of nuclear materials during the implosion phase of a nuclear weapon. (DP)* (PARTLY SUCCESSFUL: only two tests were completed because of technical challenges.)	• *Conduct ~~three or four~~ two or three[10] subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon. (DP)*	• *Conduct two subcritical experiments at the Nevada Test Site to provide valuable scientific information about the behavior of nuclear materials during the implosion phase of a nuclear weapon. (DP)*

[10] Adjusted due to increases in the cost and complexity of experiments.

Means & Strategies for FY 2000: The Department will demonstrate 3-dimensional computer codes that simulate the dynamic behavior of a nuclear weapon primary, including a prediction of total explosive yield, and simulate the dynamic response of a nuclear weapon system to the hostile radiation and blast environment of reentry. Also, DOE will continue construction of the National Ignition Facility at the Lawrence Livermore National Laboratory, including continuation of construction of conventional facilities, completing facilitization of optics vendors, and completing pilot production for the facility's optics components The laboratories will work at the Nevada Test Site to design, engineer, field, and execute subcritical experiments

NS-3 Ensure the vitality of DOE's national security enterprise (DP, NN, MD, WT)

Long-term Strategies: Over the next several years, the Department will (1) provide an appropriately-sized, cost-effective, safe, secure, and environmentally sound national security enterprise; (2) ensure that sufficient scientific and technical personnel are available to meet DOE's long-term national security requirements; (3) ensure and enhance protection of nuclear materials, sensitive information, and facilities; (4) provide DOE-related intelligence and threat assessment support to members of the national security community; and (5) maintain nuclear test readiness and enhance emergency management capabilities to address any nuclear weapons, radiological, or other emergency in the United States or abroad.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS3-1 DOWNSIZING AND MODERNIZING THE NATIONAL SECURITY ENTERPRISE • *Ensuring that all facilities required for successful achievement of the Stockpile Stewardship and Management Plan remain operational, and the established schedules for downsizing and modernization of the production facilities are met. (DP)* (PARTIALLY SUCCESSFUL: Projects were behind schedule) • *Conducting Security System Reviews and Joint Tactical System Analyses at six major DOE facilities and validate through that process that adequate security measures exist. (NN)* (SUCCESSFUL) • *Working in cooperation with other Departmental elements to add at least 90 protective force personnel at various DOE field sites to enhance protection of SNM; start S&S upgrades at five facilities; and complete S&S upgrades at two facilities. (NN)* (SUCCESSFUL) • *Continuing shipment of Rocky Flats plutonium pits to Pantex with the goal of completing all shipments by FY 1999. (MD)* (SUCCESSFUL) **NS3-2** [Combined with NS3-1]	**NS3-1 DOWNSIZING AND MODERNIZING THE NATIONAL SECURITY ENTERPRISE** • *Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan remain operational (DP)* • *Meet the established schedules for downsizing and modernizing of our production facilities. (DP)* • *Complete the shipment of plutonium pits from Rocky Flats to Pantex (MD)* • *Conduct oversight reviews to ensure that an effective Safeguards and Security program is maintained at all nuclear weapons facilities. (NN)* • *Develop a comprehensive Weapons of Mass Destruction Defense Plan which addresses security planning, equipment, training, and exercise requirements (NN)* • *Plan, coordinate, conduct and participate in an Interagency National Security Technology Exchange (INTSE) conference (NN)* **NS3-2** [Combined with NS3-1]	**NS3-1 DOWNSIZING AND MODERNIZING THE NATIONAL SECURITY ENTERPRISE** • *Ensure that all facilities required for successful achievement of the Stockpile Stewardship Plan remain operational. (DP)* • *Meet the established schedules for downsizing and modernizing our production facilities (DP)* • *Complete the upgrade of storage facilities at the Pantex Plant for storing surplus plutonium pits (MD)* **NS3-2** [Combined with NS3-1]

NS-3 Ensure the vitality of DOE's national security enterprise. (DP, NN, MD, WT) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS3-3 PROTECTING NUCLEAR MATERIALS, PRODUCTION, AND FACILITIES • *Developing and field testing an advanced vehicle portal test bed designed to prevent entry of unauthorized personnel and contraband. (NN)* (SUCCESSFUL) • *Completing plans and preparations for initiating in FY 1999, the correction of DOE infrastructure vulnerabilities identified by the President's Commission on Critical Infrastructure Protection. (NN)* (PARTIALLY SUCCESSFUL: Completion was delayed until just after the end of the fiscal year Submission of plans to the National Security Council was accomplished on November 18, 1998)	**NS3-3 PROTECTING NUCLEAR MATERIALS, PRODUCTION, AND FACILITIES** • *Initiate needed material protection, control, and accountability upgrades at DOE facilities with weapons-usable material. (NN)* • *Further the protection of all U.S. origin nuclear materials in the U.S. and abroad from possible theft, loss, or illicit trafficking. (NN)* • *Develop information on nuclear materials contained in waste in a new Departmental database for all nuclear materials by the end of the first quarter of FY 1999. (NN)* • *Develop advanced safeguards and security technologies for implementation in FY 2000. (NN)* • *Implement advanced technologies to prevent the theft or diversion of special nuclear materials including the unattended on-line gamma-ray monitor. (NN)* • *Issue timely technical reports and threat assessments regarding potential domestic and/or foreign proliferant risks. (NN)*	**NS3-3 PROTECTING NUCLEAR MATERIALS, PRODUCTION, AND FACILITIES** • *Continue material protection, control, and accountability upgrades at DOE facilities with weapons-usable material. (NN)* • *Expand forensic analysis for improved cyber security for classified information systems. (NN)* • *Reduce DOE facilities' vulnerabilities to chemical threats through sensor development and chemical protective equipment. (NN)* • *Initiate the correction of DOE infrastructure vulnerabilities identified by the President's Commission on Critical Infrastructure Protection (NN)*
NS3-4 [Combined with NS3-3]	**NS3-4** [Combined with NS3-3]	**NS3-4** [Combined with NS3-3]

NS-3 Ensure the vitality of DOE's national security enterprise. (DP, NN, MD, WT) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS3-5 MAINTAINING READINESS FOR NUCLEAR EMERGENCIES	**NS3-5 MAINTAINING READINESS FOR NUCLEAR OR OTHER[11] EMERGENCIES**	**NS3-5 MAINTAINING READINESS FOR NUCLEAR OR OTHER EMERGENCIES**
• *Ensuring that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT through a combined experimental and test readiness program. (DP)* (FULLY SUCCESSFUL)	• *Ensure that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the Comprehensive Test Ban Treaty. (DP)*	• *Ensure that the capability to resume underground testing is maintained in accordance with the Presidential Decision Directive and Safeguard C of the CTBT. (DP)*
• *Maintaining robust emergency response assets in accordance with Presidential Decision Directive 39, The Atomic Energy Act of 1954 and Executive Order 12656 to ensure Departmental response to any nuclear weapons or radiological emergency in the United States or abroad. (DP)* (FULLY SUCCESSFUL)	• *Demonstrate improvement of a comprehensive management system to ensure effective Departmental response to all DOE emergencies. (NN)*	• *Demonstrate improvement of a comprehensive management system to ensure effective Departmental response to all DOE emergencies. (NN)*
	• *Maintain robust emergency response assets in accordance with Presidential Decision Directive 39, The Atomic Energy Act, Executive Order 12656, and Federal Emergency Plans (DP/NN)*	• *Maintain robust emergency response assets in accordance with Presidential Decision Directive 39, The Atomic Energy Act, Executive Order 12656, and Federal Emergency Plans. (DP)*
	• ~~*Coordinate with Federal, State, and local governments and private energy companies to achieve prompt restoration of energy systems following major domestic energy emergencies. (NN)*~~ [12]	

[11] Revised to include both DP and NN's role.

[12] Prohibited by the FY 1999 Defense Authorization Act and the Energy and Water Appropriation.

NS-3 Ensure the vitality of DOE's national security enterprise. (DP, NN, MD, WT) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS3-6 MANAGING CONTRACTOR WORK FORCE RESTRUCTURING <moved from CM-3> • *Implementing a single Department-wide automated contractor workforce employment data system. (WT)* (SUCCESSFUL) • *Achieving annual recurring cost savings from separated workers that are at least three times the one time cost of separation. (WT)* (FULLY SUCCESSFUL) • *Supporting local community transition activities that will create 8,000 to 12,000 new private sector jobs by the end of FY 1998. (WT)* (FULLY SUCCESSFUL)	**NS3-6 MANAGING CONTRACTOR WORK FORCE RESTRUCTURING** <moved from CM-3> • *Implement initiatives to accelerate asset conversion and reuse that will result in more than $1 billion in long term savings to the Department and facilitate economic diversification of local communities. (WT)* • *Keep involuntary separations between 30 and 60 percent of positions eliminated while assuring maintenance of essential work force skills mix and productivity. (WT)* • *Achieve annual recurring costs savings from separated workers that is at least three times the one time cost of separation. (WT)* • *Support local community transition activities that will create, cumulatively, 15,000 to 20,000 new private sector jobs by the end of FY 1999. (WT)*	**NS3-6 MANAGING CONTRACTOR WORK FORCE RESTRUCTURING** • *Limit involuntary termination of employment at Department of Energy defense nuclear facilities between 30 and60 percent of positions eliminated. (WT)* • *Achieve annual recurring costs savings from separated workers that is at least three times the one time cost of separation. (WT)* • *Support local community transition activities that will create, cumulatively, 20,00 to 30,000 new private sector jobs by the end of FY 2000. (WT)* • *Achieve at least a two to one return on reinvested proceeds from the sale or lease of underutilized assets associated with the Asset Management Pilot Program and other reindustrialization activities.(WT)*

Means & Strategies for FY 2000: The Department will continue to oversee and maintain the infrastructure and plant at government-owned, contractor-operated weapons laboratories and plants according to applicable statues, laws, agreements, and standards. At the Savannah River, Pantex, Y-12, and Kansas City sites, construction activities will continue to reduce the operating footprint and facilitate consolidation of plant functions. DOE will also maintain appropriate infrastructure, personnel knowledge and exercised skills necessary to conduct an underground nuclear test within 2-3 years. Emergency response capability will be maintained through drills, exercises, and training activities at each national asset.

The Department will also expand existing partnerships between DOE Headquarters and Field elements and forge new partnerships to ensure a concerted Departmental effort. In addition, sound and improved risk management principles will be used to maintain a flexible protection posture against today's changing threat environment. The Department will achieve the workforce restructuring objectives through headquarters oversight and contractor performance measures that will encourage cost-effective use of voluntary separation strategies, manage attrition, and internal placement. The community transition goal will be achieved through financial and technical assistance provided to community reuse organizations at the affected sites. The economic conversion goal will be achieved through headquarters technical assistance and oversight to field organizations designed to encourage the leveraging of underutilized assets to achieve cost savings.

NS-4 Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials. (DP, NN, MD, NE)

Long-term Strategy: Over the next several years, the Department will (1) dismantle nuclear warheads that have been removed from the U.S. nuclear weapons stockpile in a safe and secure manner; and (2) reduce inventories of surplus weapons-usable fissile materials worldwide in a safe, secure, transparent, and irreversible manner.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS4-1 REDUCING THE WEAPONS STOCKPILE • *Adhering to schedules for the safe and secure dismantlement of approximately 1,000 nuclear warheads that have been removed from the U.S. nuclear weapons stockpile. (DP)* (FULLY SUCCESSFUL)	**NS4-1 REDUCING THE WEAPONS STOCKPILE** • *Adhere to schedules for the safe and secure dismantlement of approximately ~~500~~ 275 [13] nuclear warhead that have been removed from the U.S. nuclear weapons stockpile. (DP)*	**NS4-1 REDUCING THE WEAPONS STOCKPILE** • *Adhere to schedules for the safe and secure dismantlement of approximately 375 nuclear warheads that have been removed from the U.S. nuclear weapons stockpile. (DP)*
NS4-2 REDUCING INVENTORIES OF SURPLUS WEAPONS-USABLE FISSILE MATERIALS WORLDWIDE IN A SAFE, SECURE, TRANSPARENT, AND IRREVERSIBLE MANNER • *Successfully completing irradiation of advanced LEU research reactor fuel test assembly to medium burn-up level at the ATR reactor in Idaho by March 1998. (NN)* (FULLY SUCCESSFUL) • *Completing the dilution of 13 metric tons of excess HEU (approximately 3.5 metric tons in FY 1998) to LEU and implementing international safeguards at the Portsmouth Gaseous Diffusion Plant by August 1998. (NE/NN)* (FULLY SUCCESSFUL) • *Conducting international inspection of the dilution of 7 metric tons of HEU by September 1998. (NN)* (FULLY SUCCESSFUL)	**NS4-2 REDUCING INVENTORIES OF SURPLUS WEAPONS-USABLE FISSILE MATERIALS WORLDWIDE IN A SAFE, SECURE, TRANSPARENT, AND IRREVERSIBLE MANNER** • *Complete the final Environmental Impact Statement and issue a Record of Decision on siting plutonium disposition facilities. (MD)* • *Place over 20 metric tons of excess highly enriched uranium (HEU) under International Atomic Energy Agency (IAEA) safeguards. (NN)* • ~~*Initiate design and equipment procurement for a pilot-scale system in Russia to convert weapons plutonium to forms suitable for disposition and international inspection.*~~ *Initiate, by the end of FY 1999, negotiations with Russia on a bilateral agreement for the disposition of surplus weapons plutonium.*[14] *(MD)*	**NS4-2 REDUCING INVENTORIES OF SURPLUS WEAPONS-USABLE FISSILE MATERIALS WORLDWIDE IN A SAFE, SECURE, TRANSPARENT, AND IRREVERSIBLE MANNER** • *Proceed with the design of key U.S. surplus plutonium disposition facilities by initiating Title I design for the Immobilization and Associated Processing Facility and completing Title I and initiating Title II design for the Pit Disassembly and Conversion and the MOX Fuel Fabrication Facilities. (MD)* • *Place 10 metric tons of excess highly enriched uranium (HEU) under International Atomic Energy Agency (IAEA) safeguards in FY 2000. (NN)*

[13] Reduction results from safety concerns, underestimated startup times for different weapon types, and constrained resources

[14] Change reflects Presidential commitments regarding plutonium disposition resulting from the September 1998 U S /Russian Summit

NS-4 Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials. (DP, NN, MD, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Ensuring 100 percent completion of progress reports on technical, legal and financial issues of the Trilateral Initiative and conduct evaluation of verification and monitoring technology by August 1998. (NN)* (FULLY SUCCESSFUL)	• *Monitor the dilution of 30 metric tons of highly enriched uranium (HEU) to low enriched uranium (LEU) from dismantled Russian nuclear weapons for purchase by the United States Enrichment Corporation. (NN)*	• *Transfer 7 metric tons of highly enriched uranium to the United States Enrichment Corporation for down blending to low enriched uranium for sale and subsequent peaceful use in commercial nuclear reactors. (MD)*
• *Fully implementing all transparency monitoring tasks associated with the dilution of 24 metric tons of HEU from dismantled Russian nuclear weapons to low enriched uranium (LEU) for purchase by the United States Enrichment Corporation (NN)* (SUCCESSFUL)	• *Evaluate the impacts of warhead dismantlement and transparency initiatives. (NN)*	• *Begin to implement a bilateral agreement with Russia for disposing of surplus weapons plutonium. (MD)*
• *Beginning the transfer of U.S. surplus HEU to the United States Enrichment Corporation for dilution and subsequent sale. (MD* (FULLY SUCCESSFUL)	• *Initiate design for Pit Disassembly and Conversion and Mixed Oxide (MOX) Fuel Fabrication facilities. (MD)*	• *Ensure safe, secure storage of spent nuclear fuel at the BN-350 Reactor in Rktau, Kazakhstan. Complete canning of the 2,000 spent fuel rods in the pool. (NN)*
• *Completing initial demonstration of a prototype integrated plutonium pit disassembly and conversion system. (MD)* (SUCCESSFUL)	• *Continue transfer of U.S. surplus HEU to the United States Enrichment Corporation for dilution and subsequent sale. (MD)*	• *Evaluate the impacts of warhead dismantlement and transparency initiatives. (NN)*
• *Completing procurement for a private sector consortium to provide MOX fuel fabrication and irradiation services. (MD)* (SUCCESSFUL)	• *Remove all highly enriched uranium oxides from the Portsmouth site (NE)*	• *Conduct Russian technology demonstrations to further warhead dismantlement or transparency measures. (NN)*
• *Initiating development of a Russian plutonium conversion and nondestructive assay prototype system. (MD)* (FULLY SUCCESSFUL)	• *Accomplish the milestones of the FMFIA corrective action plan for the Departmental challenge of surplus fissile materials. (MD/NN)*	• *Monitor the dilution of 30 metric tons of highly enriched uranium (HEU), from dismantled Russian nuclear weapons, to low enriched uranium (LEU) for purchase by the United States Enrichment Corporation. (NN)*

NS-4 Reduce nuclear weapons stockpiles and the proliferation threat caused by the possible diversion of nuclear materials. (DP, NN, MD, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
		• *Conduct 24 special monitoring team visits to Russian HEU conversion and blending facilities; maintain a permanent presence office in Russia, and continue the planning for a second permanent presence office to be established at the Siberian Chemical Enterprise (NN)* • *Maintain and monitor the UF_6 flow and enrichment measurement nondestructive assay systems installed at the blend points at two Russian HEU dilution facilities. (NN)* • *Compile and analyze collected data and information into an assessment of confidence of compliance with the nonproliferation objectives of the HEU Agreement. (NN)*

Means & Strategies for FY 2000: The Department will further reduce the nuclear danger by continuing a program of dismantling retired weapons, including studies and development of safe dismantlement procedures, characterization and disposition of components, and long term storage The Department will also ensure that adequate budgetary and infrastructure resources and personnel are available to meet all program goals in a timely manner. To support highly enriched uranium disposition efforts, ensure that adequate numbers of ES-2 shipping containers, safe-secure transports (SSTs), and skilled personnel at the Oak Ridge Y-12 facility are available to package and ship the highly enriched uranium to down blending facilities. To support plutonium disposition efforts, complete the record of decision to select the site(s) where U.S. plutonium disposition will take place; ensure that a contract award is made to an industry consortium for the design of the MOX Fuel Fabrication Facility; and select architect-engineering (A&E) firm(s) to design the Pit Disassembly and Conversion Facility and the Immobilization and Associated Processing Facility. In support of work with Russia, develop with the State Department an interagency agreed-upon set of U.S. goals prior to proceeding to negotiate a plutonium disposition agreement with Russia; and conduct bilateral negotiations with Russia leading to a binding agreement for disposition of the Russian and U.S. plutonium declared excess to defense needs. If necessary, conduct multilateral negotiations with other G-8 nations to solidify their support.

NS-5 Continue leadership in policy support and technology development for international arms control and nonproliferation efforts. (NN)

Long-term Strategy: Over the next several years, the Department will (1) strengthen the nuclear nonproliferation regime through support of treaties and international agreements; (2) work with the states of the former Soviet Union and others to minimize the risks of proliferation; and (3) advance nonproliferation technology

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS5-1 STRENGTHENING THE NUCLEAR NONPROLIFERATION REGIME • *In support of a Comprehensive Test Ban Treaty (CTBT), finalizing a plan for joint cooperation with the Russians to conduct a confidence-building activity by September 1998 (NN)* (PARTIALLY SUCCESSFUL. Placed on hold because discussions held in June and August 1998 have not reached a final determination on the scope of activities.) • *Beginning a long-term nuclear spent fuel maintenance program in the Democratic Peoples Republic of Korea (DPRK) by June 1998, assuring a stable, non-corrosive storage for the duration of the program. (NN)* (PARTIALLY SUCCESSFUL: The work was put on hold due to DPRK's frustration with deliveries of heavy fuel oil to DPRK.) • *Leading, via Joint Chairmanship, the interagency task force on warhead and fissile material, to create START III options for warhead elimination by January 1998. (NN)* (FULLY SUCCESSFUL) • *Providing equipment, technologies and expertise to the IAEA and the United Nations Special Commission (UNSCOM) to perform monitoring and intrusive inspections in North Korea and Iraq sufficient to verify compliance with their obligations under the NPT. (NN)* (FULLY SUCCESSFUL)	**NS5-1 STRENGTHENING THE NUCLEAR NONPROLIFERATION REGIME** • *Support U.S.-lead negotiations on the Fissile Material Cut-Off Treaty at the United Nations multi-lateral conference on disarmament in Geneva. (NN)*	**NS5-1 STRENGTHENING THE NUCLEAR NONPROLIFERATION REGIME** • *Support negotiations on the Fissile Materials Cut-off Treaty. (NN)* • *Implement a nuclear spent fuel maintenance plan by continuing technical dialogue with the Democratic Peoples Republic of Korea (DPRK) (NN)* • *Lead, via the Joint Chairmanship, the interagency task force on warhead and fissile material to implement a START III concept for warhead elimination by July 2000. (NN)* • *Provide equipment, technologies, & expertise to the IAEA and the United Nations Special Commission (UNSCOM) to perform monitoring & intrusive inspections in North Korea and Iraq sufficient to verify compliance with their obligations under the Non-Proliferation Treaty (NPT). (NN)*

NS-5 Continue leadership in policy support and technology development for international arms control and nonproliferation efforts. (NN) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS5-2 MINIMIZING THE RISKS OF PROLIFERATION • *Making progress in material protection, control and accounting (MPC&A) upgrades at each of the 53+ facilities in Russia, the Newly Independent States (NIS), and the Baltics that use or store weapons-usable nuclear material. (NN)* (PARTIALLY SUCCESSFUL Completed upgrades at 19 sites) • *Commissioning the MPC&A system at the Chelyabinsk-70 pulse research reactor by July 1998.(NN)* (FULLY SUCCESSFUL) • *Completing the rapid security upgrades on at least 1/2 of the 35 rail cars used to transport weapons-usable nuclear materials in Russia by September 1998. (NN)* (SUCCESSFUL) • *Developing and implementing 12 commercial development projects at 6 primary biological and chemical weapons research and production facilities in Russia and Kazakhstan engaging an estimated 80 weapons experts. At least 6 projects will have subcontracts in place by April 1998 with the remaining 6 subcontracts in place by September 1998.(NN)* (FULLY SUCCESSFUL) • *Developing and implementing 30 commercial development projects at nuclear weapons research and production facilities in Russia, Ukraine and Kazakhstan engaging approximately 1,000 weapons experts. All subcontracts will be in place by September 1998. (NN)* (FULLY SUCCESSFUL)	**NS5-2 MINIMIZING THE RISKS OF PROLIFERATION** • *Continue to improve and integrate technology practices, facilities, and training for material protection, control, and accounting for approximately 650 metric tons of weapons-usable material at 53 locations. (NN)* • *Field an initial joint DOE-Customs Service remote inspection system capable of identifying radiation signatures of potential nuclear smuggling packages. (NN)* • *Support non-proliferation objectives through concluding key science and technology agreements on: (PO)* -- *Geologic research connected to radioactive waste disposal with the Russian Ministry of Atomic Energy;* -- *Renewal of the existing Peaceful Uses of Atomic Energy Agreement and beginning negotiations for a new and expanded agreement with Russia;* -- *Specific cooperative projects under the U.S.-China Peaceful Uses of Nuclear Technologies Agreement.*	**NS5-2 MINIMIZING THE RISKS OF PROLIFERATION** • *Continue to install MPC&A upgrades for defense-related sites in Russia, including 5 major uranium and plutonium cities, 3 nuclear weapons complex sites, 10 Russian Navy projects, and security upgrades in the transportation sector.(NN)* • *Continue to install MPC&A upgrades to Russian civilian and regulatory-related sites. (NN)* • *Complete installation of MPC&A upgrades in all Russian Naval fresh fuel by December 2000. (NN)* • *Equip 2-3 Russian sites and conduct 2 joint training sessions under a Second Line of Defense Initiative. (NN)* • *Cooperate with Russian Federation Customs to create civilian ventures in Russia's formerly closed nuclear cities to block nuclear smuggling. (NN)*

NS-5 Continue leadership in policy support and technology development for international arms control and nonproliferation efforts. (NN) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Completing technical assistance initiatives in Russia, Ukraine and Kazakhstan by May 1998 to develop a cadre of export control and technical advisors on supplier policy and nuclear transfer activities. (NN)* (SUCCESSFUL) • *Commencing prototypic fuel testing by July 1998 to support the core modifications required for the cessation of plutonium production at three Russian reactors. (NN)* (SUCCESSFUL)		
NS5-3 ADVANCING NONPROLIFERATION TECHNOLOGY • *Transferring to the FBI newly developed technology which will provide a capability for rapid, sensitive, in-field analysis of hazardous biological materials and quick determination of associated terrorist threats. (NN)* (PARTIALLY SUCCESSFUL. This is a multi-year effort and there are 18 jointly funded projects underway.) • *Delivering to the CTBT U.S. National Data Center a commercializable prototype of an ultrasensitive near-real-time analyzer for nuclear explosion produced Xenon isotopic gases. (NN)* (SUCCESSFUL) • *Completing an airborne demonstration of a one-of-a-kind, quantitative chemical plume characterization capability, that uses lasers for weapons production facility monitoring. (NN)* (FULLY SUCCESSFUL)	**NS5-3 ADVANCING NONPROLIFERATION TECHNOLOGY** • *Complete development and delivery to customers of two new counter-nuclear-smuggling detection technologies, one portable/hand-held and the other for wide area tracking and interdiction. (NN)* • *Demonstrate, through airborne field tests, two new technologies that use chemical detection methods to remotely characterize weapons-of-mass-destruction proliferation activities. (NN)* • *Deliver to the U.S. National Data Center for the Comprehensive Nuclear-Test-Ban Treaty the first half (Release 3) of an operational knowledge base that can be accessed by automated processing systems and human analysts to provide monitoring and verification confidence. (NN)*	**NS5-3 ADVANCING NONPROLIFERATION TECHNOLOGY** • *Develop improved technologies and systems for early detection, identification, and response to weapons of mass destruction proliferation and illicit materials trafficking (NN)* • *Deliver three improved sensor systems for treaty monitoring to the U.S. Air Force. (NN)* • *Deliver advanced technologies and analytical capabilities that comprise 80 percent of a knowledge base delivery to the CTBT U.S. National Data Center. (NN)* • *Complete a prototype hand-held detector for enhanced detection of chemical agents. (NN)* • *Develop and test a prototype subway protection system that integrates chemical sensor and predictive models into an emergency response information system. (NN)*

NS-5 Continue leadership in policy support and technology development for international arms control and nonproliferation efforts. (NN) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Delivering to the U S. Air Force spacecraft integrating contractor the first 5 flight units of an extended-energy-range X-ray sensor for monitoring of nuclear explosions in space. (NN)* (FULLY SUCCESSFUL)		

Means & Strategies for FY 2000: In accomplishing its mission, the Department will call upon existing scientific and engineering expertise and laboratory facilities at eleven of the Department's national laboratories. Because of the crosscutting nature of the many international arms control and nonproliferation projects, the human and technological resources employed are by necessity multi-disciplinary, requiring a diverse technology base. The emphasis throughout the international arms control and nonproliferation program is close coordination with internal and external customers, to ensure responsiveness to their actual needs.

NS-6 Meet national security requirements for naval nuclear propulsion and for other advanced nuclear power systems. (NR)

Long-term Strategies: Over the next several years, the Department will (1) provide the U.S. Navy with safe, militarily- effective nuclear propulsion plants and ensure their continued safe and reliable operation; and (2) meet ongoing and future national security requirements for special nuclear power systems.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS6-1 PROVIDING SPECIAL NUCLEAR POWER SYSTEMS FOR NATIONAL SECURITY • *Developing new reactor plants, including the next generation reactor, the design of which will be 75 percent complete in FY 1998 and ensuring the safety, performance reliability, and service-life of operating reactors. (NR)* (FULLY SUCCESSFUL)	**NS6-1 PROVIDING SPECIAL NUCLEAR POWER SYSTEMS FOR NATIONAL SECURITY** • *Develop new reactor plants, including the next generation reactor, which will be 85 percent complete by the end of FY 1999, and ensure the safety, performance reliability, and service-life of operating reactors. (NR)* • *Ensure radiation exposures to workers or the public from Naval Reactors' activities are within Federal limits and no significant findings result from environmental inspections by State and Federal regulators. (NR)*	**NS6-1 PROVIDING SPECIAL NUCLEAR POWER SYSTEMS FOR NATIONAL SECURITY** • *Develop new reactor plants, including the next generation reactor, which will be 90 percent complete by the end of FY 2000, and complete initial development efforts on a reactor plant for CVNX. Ensure the safety, performance reliability, and service-life of operating reactors. (NR)* • *Ensure radiation exposures to workers or the public from Naval Reactors' activities are within Federal limits and no significant findings result from environmental inspections by State and Federal regulators. (NR)*
NS6-1 [Combined with NS6-1]	**NS6-1** [Combined with NS6-1]	**NS6-1** [Combined with NS6-1]

Means & Strategies for FY 2000: To support development of reactor plants for the VIRGINIA Class submarines and the CVNX aircraft carrier; ensure safety, reliability and performance of operating reactor plans in Navy warships; and meet Navy goals for extended warship operation, the Department will:

Complete scheduled design, analysis, and testing of reactor plant components and systems.

Conduct planned development, testing, examination, and evaluation of nuclear fuel systems, materials, and manufacturing and inspection methods.

Accomplish planned testing, training and servicing involved with land-based prototype nuclear propulsion plants.

Carry out radiological control, environmental, and safety operations necessary to protect people, minimize release of hazardous effluents to the environment, and comply with all applicable regulations.

NS-7 Improve international nuclear safety. (NN, formerly NE)

Long-term Strategies: Over the next several years, the Department will (1) assist countries in reducing the risks from Soviet-designed nuclear power plants and implement a self-sustaining nuclear safety improvement program capable of reaching internationally accepted safety practices; (2) promote nuclear safety culture improvements internationally by providing strong leadership in international nuclear safety organizations and centers; and (3) assist in the multi-national effort to shut down Chornobyl Units 1, 2, and 3 in Ukraine before January 2001 and reduce the risk of possible collapse of the Unit 4 sarcophagus.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS7-1 ENHANCING THE SAFETY OF SOVIET-DESIGNED REACTORS AND PROMOTING INTERNATIONAL NUCLEAR SAFETY • *Completing development of plant models and descriptions, conducting training programs and performing safety analysis calculations at the South Ukraine Unit 1 in Ukraine and the Kola Unit 4 in Russia, as part of in-depth safety assessments at nuclear power plants in Ukraine and in Russia. (NN)* (SUCCESSFUL) • *Completing nuclear power plant simulator projects, at Novovoronezh in Russia and at Khmelnytskyy and Chornobyl in Ukraine. (NN)* (SUCCESSFUL) • *Completing the installation of Safety Parameter Display Systems at the Zaporizhzhya plant in Ukraine and at the Novovorenezh plant in Russia. (NN)* (SUCCESSFUL)	**NS7-1 ENHANCING THE SAFETY OF SOVIET-DESIGNED REACTORS AND PROMOTING INTERNATIONAL NUCLEAR SAFETY** • *Complete the development and implementation of an effective reactor plant operator training program at key plants based on the Systematic Approach to Training methodology used in the United States and provide and incorporate plant simulators into the operator training programs. (NN)* • *Complete plans for critical asset identification within the Department and test vulnerability assessment techniques in two components of the Energy Sector. (NN)* • *Provide preliminary safety assessment results to determine near-term safety improvements.(NN)* • *Complete the installation of Safety Parameter Display Systems to improve operator response to emergencies at Leningrad Unit 4 and Novororonezh Unit 4. (NN)* • *Promote U.S. positions and practices in international forums that advocate safe reactor operations. (NN)*	**NS7-1 ENHANCING THE SAFETY OF SOVIET-DESIGNED REACTORS AND PROMOTING INTERNATIONAL NUCLEAR SAFETY** • *Complete the installation of Safety Parameter Display Systems to improve operator response to emergencies at Smolenck Unit 3 in Russia and at South Ukrane Unit 2, Rivne Unit 3, and Zaporizhzhya in Ukraine. (NN)* • *Promote U.S. positions and practices in international forums that advocate safe reactor operations. (NN)* • *Complete a full-scope simulator for Russia's Kalinin plant unit 1. (NN)* • *Complete an in-depth safety assessment at Russia's Leningrad plant. (NN)* • *Complete a control and protection system upgrade at Lithuania's Ignalina plant unit 2. (NN)*
NS7-2 [Combined with NS7-1]	**NS7-2** [Combined with NS7-1]	**NS7-2** [Combined with NS7-1]

NS-7 Improve international nuclear safety. (NN, formerly NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
NS7-3 ASSISTING IN THE SHUTDOWN OF THE CHORNOBYL NUCLEAR POWER PLANT • *Providing the Chornobyl plant with equipment for dose reduction, nuclear safety monitoring, dust suppression, and industrial safety. (NN)* (SUCCESSFUL) • *Reaching an agreement with the Ukrainians on Chornobyl Unit 1 defueling. (NN)* (SUCCESSFUL)	**NS7-3 ASSISTING IN THE SHUTDOWN OF THE CHORNOBYL NUCLEAR POWER PLANT** • *Complete a comprehensive decommissioning engineering survey of Chornobyl Unit 1. (NN)*	NS7-3 [Combined with NS7-1]

Means & Strategies for FY 2000: In accomplishing its mission, the Department will call upon its existing scientific and engineering expertise and its laboratory facilities. Because of the nature of the many international nuclear safety projects, the human and technological resources employed are by necessity multi-disciplinary, requiring a diverse technology base. The emphasis throughout the international nuclear safety program is close coordination with internal and external customers, to ensure responsiveness to their actual needs.

ENVIRONMENTAL QUALITY

GOAL: Aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the Nation's radioactive wastes.

By 2006, the Environmental Management (EM) program intends to complete cleanup at most of its 53 [15] remaining sites. At the 10 sites remaining after 2006, including our five largest sites, treatment will continue for the remaining "legacy" waste streams and management (including stabilization and disposition) of legacy nuclear materials will continue. Even after completing cleanup, the Department will maintain a presence at most sites to ensure that the reduction in risk to human health and the environment is maintained. Such "long-term stewardship" will include passive or active institutional controls and, often, treatment of groundwater over a long period of time.

Achieving our accelerated site completion goals will require the Department to improve productivity and reduce the life-cycle costs of cleanup. The geographic site completion goals, shown in the following site completion graph, are based on EM's most aggressive budget and planning scenarios and assume the maximum possible gains in efficiency. At some of these sites, these goals are extremely ambitious and represent challenges rather than specific commitments.

The Department has established cleanup goals and remedies for each contaminated area through processes involving federal and state laws and other legal agreements. These processes include input from decision makers outside of the Department, such as states, the U.S. Environmental Protection Agency (EPA), and the U.S. Nuclear Regulatory Commission. Environmental remediation activities are based primarily on requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended; the Resource Conservation and Recovery Act (RCRA); and the National Environmental Policy Act (NEPA).

[15] EM's responsibilities include facilities and areas at 113 geographic sites (excluding the 21 sites in the Formerly Utilized Sites Remedial Action Program that transferred to the U.S. Army Corps of Engineers). As of the beginning of FY 1998, 60 geographic sites had been completed and 53 geographic sites (including WIPP which is a disposal site) remained to be cleaned up. During FY 1998, five geographic sites were completed leaving a total of 48 sites to be cleaned up as of the beginning of FY 1999.

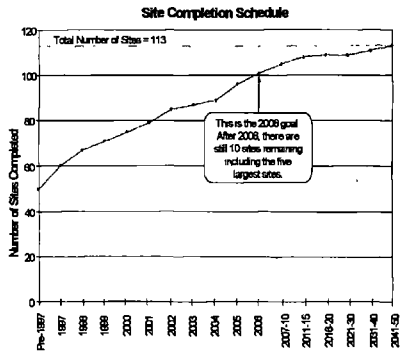


Figure 7: Site Closure Schedule

The Department will implement a formal integrated management system to more closely align the *Accelerating Cleanup: Paths to Closure* planning process with the budget formulation and execution processes. All EM activities are organized by projects, which have a defined scope, schedule and cost that support a defined end state at a specific EM site.

As with the FY 1999 Budget Request, the FY 2000 Budget Request will be organized within the following accounts to emphasize project completion and site closure: **Site Closure** (provides funding for completing cleanup and closing down facilities with no enduring Federal presence on-site, except for stewardship activities); **Site/Project Completion** (includes funding for EM projects and sites that will be completed by 2006, even though there may continue to be a Departmental mission after 2006); and **Post 2006 Completion** (funds projects that are expected to require work beyond 2006).

The FY 2000 Congressional Budget Request and the *Accelerating Cleanup: Paths to Closure* process serve as the basis for the EM commitments in this Performance Plan.

The following table maps the Presidential Budget's Program and Financing (P&F) accounts and program activities to the Department of Energy's offices and decision units. The alignment includes aggregation, disaggregation, and consolidation The table that follows this one maps DOE decision units to the business line objectives where performance measures and goals are identified.

Presidential Budget Program and Financing (P&F) Accounts and Program Activities	*FY 2000 Budget Request ($M)*	*DOE Office*	*DOE Decision Units*
050 Atomic Energy Defense Activities			
Defense Environmental Restoration and Waste Management			
Environmental Management	$4,494	EM	Defense Environmental Management
EH Health Studies	$20	EH	EH Health Studies
Defense Facilities Closure Projects	$1,054	EM	Defense Site Closure Fund
Defense Environmental Management Privatization	$396	EM	Defense Environmental Management Privatization
Defense Nuclear Waste Disposal	$112	RW	Defense Nuclear Waste Fund
Environmental Safety and Health	$92	EH	Environmental Safety and Health (Defense)
270 Energy Supply			
Non-defense Environmental Management			
Site closure	$221	EM	Site Closure Fund
Site/project completion	$101	EM	Site/Project Completion Fund
Post 2006 completion	$19	EM	Post 2006 Completion Fund
Nuclear Waste Disposal	$297	RW	Civilian Nuclear Waste
Uranium Enrichment Decontamination and Decommissioning Fund			
Environmental restoration and waste management	$210	EM	Environmental restoration and waste management
Uranium/thorium reimbursements	$30	EM	Uranium/thorium reimbursements
Environmental Safety and Health	$51	EH	Environmental Safety and Health (non-defense)
Energy Supply [16]	$269	NE	Nuclear Energy
Departmental Administration [16]	$8	FM	Field Management

[16] Only a portion of Energy Supply and Departmental Administration resources are applied to the Environmental Quality Business Line

The following table indicates which budget program/decision units support which of the business line objectives. Resources, in both funds and Full Time Equivalent staff (FTEs), are shown. FTE estimates are for the overall program offices The funds shown are program totals from DOE's budget request.

DOE Office	DOE Program/ Decision Unit	FY 2000 Budget Request ($M)	FTEs	EQ-1 Most Serious Risks First	EQ-2 Clean up	EQ-3 DOE Disposal	EQ-4 Future Pollution	EQ-5 Waste Act Disposal	EQ-6 Reduce Cost	EQ-7 Land Reuse
EM	Defense Site Closure Fund	$1,054	2,697	X	X	X	X		X	X
	Non-defense Site Closure	$211		X	X	X	X		X	X
	Defense Environmental Management	$4,494		X	X	X	X		X	X
	Non-defense Site/Project Completion Fund	$101		X	X	X	X		X	X
	Non-defense Post 2006 Completion Fund	$19		X		X	X			X
	Defense Environmental Management Privatization	$228							X	
EH	Environment, Safety & Health (non-defense)	$51	339	X						
	Environment, Safety & Health (defense)	$92		X						
	EH Health Studies	$20		X						
RW	Nuclear Waste Disposal	$297	196					X		
	Defense Nuclear Waste Fund.	$73						X		
NE	Nuclear Energy [17]	$269	144						X	
FM	Field Management[17]	$8	927							X

[17] Only a portion of Nuclear Energy and Field Management resources are applied to the Environmental Quality Business Line

EQ-1 Reduce the most serious risks from the environmental legacy of the U.S. nuclear weapons complex first. (EM, EH)

Long-term Strategy: Over the next several years, the Department will identify and fund projects to reduce the most serious risks first and prevent further increases in relative risk at all sites.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ1-1 REDUCING WORKER, PUBLIC, AND ENVIRONMENTAL RISKS • *Stabilizing and safely storing about 3.7 metric tons of heavy metal of spent nuclear fuel (SNF). [Note: SNF data excludes information that is controlled or classified.]* (EM) (PARTIALLY SUCCESSFUL Behind schedule due to bankruptcy of a subcontractor.)[18] • *Stabilizing approximately 20,000 kilograms bulk of plutonium residue and approximately 7,000 liters of plutonium solution, and safely storing stabilized material. (EM)* (PARTIALLY SUCCESSFUL. Criticality safety concerns stopped work at Richland for the year and Rocky Flats was also held up by safety issues.) • *Closing one high level waste storage tank at the Savannah River Site. (EM)* (FULLY SUCCESSFUL)	**EQ1-1 REDUCING WORKER, PUBLIC, AND ENVIRONMENTAL RISKS** • *Stabilize and safely store approximately 6 metric tons of heavy metal of spent nuclear fuel (SNF). (EM)* • *Stabilize approximately 33,000 kilograms bulk of plutonium residues, approximately 40 liters of plutonium solution, and 332 containers of plutonium metals/oxides. (EM)*	**EQ1-1 REDUCING WORKER, PUBLIC, AND ENVIRONMENTAL RISKS** • *Stabilize and safely store approximately 53 metric tons of heavy metal of spent nuclear fuel (SNF). (EM)* • *Stabilize approximately 38,000 kilograms bulk of plutonium residues, approximately 160 liters of plutonium solution, and 238 containers of plutonium metals/oxides. (EM)* • *Make disposition ready 910 containers of plutonium metals/oxides. (EM)*

Means & Strategies for FY 2000: The Department will work closely with regulators, the DNFSB, and others to achieve this objective and will prioritize and fund high risk projects, such that risk to the workers, the public, and the environment decreases over time. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned or performed. On his first day as Secretary of Energy, Secretary Bill Richardson stated that the, "safety, health and well-being of our workers and the public is a top priority of the Department."

[18] End-of-year results of FY 1998 Performance Agreement commitments are classified as "FULLY SUCCESSFUL", "SUCCESSFUL", "PARTIALLY SUCCESSFUL", or "UNSUCCESSFUL" for performance judged to be effectively 100% or better, 80-100%, 50-80%, or less than 50% respectively

EQ-2 Clean up as many as possible of the Department's 53[19] remaining contaminated geographic sites by 2006. (EM)

Long-term Strategies: The Department intends to complete clean up at most of its 53[19] remaining sites by 2006, with the remaining 10 sites (including our 5 largest) scheduled for completion in the post-2006 time frame.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ2-1 ACCELERATE AND COMPLETE GEOGRAPHIC SITE CLEANUP • *Completing remediation at 6 geographic sites. (EM)* (SUCCESSFUL) • *Making progress on release site completion· (EM)* - *Completing about 575 release site assessments* - *Completing about 280 release site cleanups.* (FULLY SUCCESSFUL) • *Making progress on facility decommissionings: (EM)* - *Completing about 90 facility decommissioning assessments* - *Completing about 70 facility decommissionings.* (FULLY SUCCESSFUL) **EQ2-2 & EQ2-3** [Combined with EQ2-1]	**EQ2-1 ACCELERATE AND COMPLETE GEOGRAPHIC SITE CLEANUP** • *Complete remediation at 3 geographic sites, increasing the total completed to 68 of 113 geographic sites. (This is a milestone of a FMFIA corrective action plan.) (EM)* • *Complete about 310 release site assessments. (EM)* • *Complete about 165 release site cleanups. (This will bring the number of completed release site cleanups to about 4,290 out of a total inventory of approximately 9,700 release sites.) (EM)* • *Complete about 120 facility decommissioning assessments. (EM)* • *Complete about 80 facility decommissionings. (This will bring the number of completed facility decommissionings to about 530 out of a total inventory of approximately 3,350 facilities.) (EM)* **EQ2-2 & EQ2-3** [Combined with EQ2-1]	**EQ2-1 ACCELERATE AND COMPLETE GEOGRAPHIC SITE CLEANUP** • *Complete remediation at 3 geographic sites, increasing the total completed to 71 of 113 geographic sites. (EM)* • *Complete about 760 release site assessments. (EM)* • *Complete about 200 release site cleanups. (This will bring the number of completed release site cleanups to about 4,490 out of a total inventory of approximately 9,700 release sites) (EM)* • *Complete about 345 facility decommissioning assessments. (EM)* • *Complete about 110 facility decommissionings. (This will bring the number of completed facility decommissionings to about 640 out of a total inventory of approximately 3,350 facilities.) (EM)* **EQ2-2 & EQ2-3** [Combined with EQ2-1]

Means & Strategies for FY 2000: The Department will first focus on reducing any off-site contamination; then on prevention of contamination migration, reduction of on-site contamination; allocation of resources to effectively maintain essential infrastructure support, funding for other essential prudent business management activities; release of facilities and land to the public for beneficial reuse where this is deemed appropriate, and finally, additional characterization efforts to reduce uncertainty at the various sites in regard to eventual cleanup approaches Cleanup progress is measured by completion of geographic sites where EM is responsible for remediation of contaminants and other material Interim progress is demonstrated by cleaning up portions of the EM geographic sites, referred to as "Release Sites" and "Facilities" Cleaning up these areas ultimately leads to the completion of the entire geographic site

[19] Fifty-three geographic sites remained to be cleaned up as of the beginning of FY 1998. This number included the addition of WIPP which is a disposal site. Five geographic sites were completed during FY 1998 (including the revocation of the designation of two UMTRA sites , Belfield and Bowman), leaving a total of 48 sites to be cleaned up as of the beginning of FY 1999.

EQ-3 Safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs, and make defense high-level radioactive wastes disposal-ready. (EM, RW)

Long-term Strategies: Over the next several years, the Department will accomplish this objective using a strategy that supports the overall Environmental Quality goal to protect the environment, workers, and the public by minimizing exposure to, and eliminating hazards associated with managing radioactive and hazardous wastes. Waste management strategies to accomplish this objective will aim to: (1) reduce inventory levels of the Nation's cold war legacy and newly generated wastes, (2) ensure safe and efficient storage, treatment, and disposal of waste by providing adequate facilities and resources to protect environmental quality; (3) engage regulators and the public to increase cooperation and understanding, and (4) comply with regulatory requirements and safe work practices.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ3-1 OPENING THE WASTE ISOLATION PILOT PLANT • *Shipping between 388 and 592 cubic meters of transuranic (TRU) waste to WIPP for disposal from three DOE sites (Los Alamos National Laboratory, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory). (EM)* (UNSUCCESSFUL. WIPP was ready but litigation stopped shipping of TRU.) **EQ3-2 MAKING DISPOSAL READY AND DISPOSING OF WASTE GENERATED DURING PAST AND CURRENT DOE ACTIVITIES** • *Disposing of about 4,000 cubic meters of mixed low level waste (MLLW). (EM)* (FULLY SUCCESSFUL) • *Disposing of about 30,000 cubic meters of low level waste (LLW). (EM)* (FULLY SUCCESSFUL) • *Producing 200 canisters of high level waste (HLW) at the Defense Waste Processing Facility (DWPF) at the Savannah River Site. (EM)* (FULLY SUCCESSFUL) • *Producing approximately 88 canisters of HLW at the West Valley Demonstration Project. (EM)* (FULLY SUCCESSFUL)	**EQ3-1 MAKING DISPOSAL READY AND DISPOSING OF WASTE GENERATED DURING PAST AND CURRENT DOE ACTIVITIES** • *Make disposal ready about 700 cubic meters of TRU waste. (EM)* • *Ship about 700 cubic meters of TRU waste to WIPP for disposal. (EM)* • *Dispose of about 15,000 cubic meters of MLLW. (EM)* • *Dispose of about 73,000 cubic meters of LLW. (EM)* • *Produce about 200 canisters of HLW at the Defense Waste Processing Facility at the Savannah River Site. (EM)* • *Produce about 15 canisters of HLW at the West Valley Demonstration Project. (EM)*	**EQ3-1 MAKING DISPOSAL READY AND DISPOSING OF WASTE GENERATED DURING PAST AND CURRENT DOE ACTIVITIES** • *Make disposal ready about 3,400 cubic meters of TRU waste. (EM)* • *Ship about 3,400 cubic meters of TRU waste to WIPP for disposal. (This is about 2 percent of the total TRU waste that requires disposal between FY 1998 and FY 2070.) (EM)* • *Dispose of about 15,000 cubic meters of MLLW. (This completes about 14 percent of the total MLLW that requires disposal between FY 1998 and FY 2070.) (EM)* • *Dispose of about 79,000 cubic meters of LLW. (This completes about 9 percent of the total LLW that requires disposal between FY 1998 and FY 2070.) (EM)* • *Produce about 100 canisters of HLW at the Defense Waste Processing Facility at the Savannah River Site. (This completes about 15 percent of the total canisters that will be produced at SRS from FY 1996 to life-cycle completion.) (EM)* • *Produce about 5 canisters of HLW at the West Valley Demonstration Project. This completes more than 90 percent of the total canisters that will be produced at West Valley from FY 1996 to life-cycle completion. (EM)*

Means & Strategies for FY 2000: Waste management programs will continue to dispose of DOE low-level and mixed radioactive waste primarily at its current disposal facilities although the Department, with stakeholder participation, will consider alternative disposition paths that are more cost-effective while still protective of the public and the environment. Operations will minimize generation of new waste, re-use, and recycle where possible to accomplish pollution prevention goals. In addition, the Department will continue to re-engineer waste management practices and strive to have newly generated wastes disposed as generated.

Waste management activities will ensure safe handling and storage of waste in addition to maximizing isolation to reduce risks. The Department will prepare transuranic waste for disposal at the Waste Isolation Pilot Plant (WIPP) and ship as soon as legal constraints are removed; and continue to prepare high-level waste for disposal in the nation's future deep geologic repository.

The Department will integrate waste management programs across the DOE complex by consolidating waste storage, treatment and disposal facilities to maximize efficiency, reduce environmental risks and costs of operations. Efforts will continue to improve the quality and value of information on the generation, inventory, management, and transportation of DOE waste.

EQ-4 Prevent future pollution. (EM, DP, NE, SC)

Long-term Strategy: Over the next several years, the Department will minimize waste generation at the source as much as technically feasible and economically practicable and eliminate emissions and discharges, giving priority to those waste streams that may present the greatest potential risk to health or the environment.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ4-1 PREVENTING FUTURE POLLUTION • *Reducing routine waste generation by 40 percent, compared with 1993 waste generation rates. [Data for reporting will be available at the end of calendar year 1998] (EM)* (FULLY SUCCESSFUL) • *Reducing/avoiding the generation of radioactive, mixed, and hazardous wastes by about 4,000 cubic meters [Data for reporting will be available at the end of calendar year 1998] (EM)* (FULLY SUCCESSFUL)	**EQ4-1 PREVENTING FUTURE POLLUTION** • *Reduce routine waste generation by 45 percent based on 1993 waste generation rates. (Data for reporting will be available at the end of calendar year 1999.) (EM)* • *Implement projects that reduce/avoid the generation of radioactive, mixed, and hazardous wastes by 2,000 cubic meters. (EM)* • *Reduce by 10 percent the waste resulting from the execution of cleanup, stabilization and decommissioning activities, from the annual planned baseline volumes. (EM)*	**EQ4-1 PREVENTING FUTURE POLLUTION** • *Reduce routine waste generation by 50% by December 1999, based on 1993 waste generation rates (EM)* • *Reduce by 10 percent the waste resulting from the execution of cleanup, stabilization and decommissioning activities, from the annual planned baseline volumes. (EM)*

Means & Strategies for FY 2000: The Department will apply pollution prevention techniques such as material substitution, process modification, segregation/reuse, and recycling, where they would not increase the life cycle cost of the cleanup/stabilization/waste management projects. The Department will expand its pollution prevention goals to the year 2005 and each site will update its triennial pollution prevention plan to reflect new goals by the Spring of 2000. The Department will use Life Cycle Asset Management (LCAM) Order (430.1) to ensure that pollution prevention is designed into all new facilities and major modifications. Headquarters/Operations/Field Offices will be held accountable for implementing site Pollution Prevention Plans and LCAM Agreements Through an expanded field assessment program, the Department will measure success through continuous improvement and trending towards zero waste generation and emissions.

EQ-5 Dispose of high-level radioactive waste and spent nuclear fuel in accordance with the Nuclear Waste Policy Act as amended. (RW)

Long-term Strategies: Over the next several years, the Department will (1) complete the scientific and technical analyses of the Yucca Mountain site, and if it is determined to be suitable for a geologic repository, obtain a license from t he Nuclear Regulatory Commission; and (2) maintain the capability to initiate plans to transport spent nuclear fuel and high level waste as soon as a Federal facility is designated under the Nuclear Waste Policy Act

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ5-1 CONTINUING WITH YUCCA MOUNTAIN SITE CHARACTERIZATION • *Completing the viability assessment analyses for licensing and constructing a geologic repository at the Yucca Mountain site. The assessment will consist of four key components: (RW)* - *A design and operational concept of the repository;* - *An assessment of the performance of that concept in the geologic setting,* - *A plan and cost estimate to construct and operate the repository, and* - *A plan and an estimate of the costs to complete a license application* (FULLY SUCCESSFUL) **EQ5-2 DEVELOPING WASTE ACCEPTANCE AND TRANSPORTATION CAPABILITY** • *Completing generic, non-site-specific interim storage facility work and addressing long lead-time issues related to storage of waste including design, engineering, and safety analyses. (RW)* (FULLY SUCCESSFUL) • *Developing a market-driven approach that uses private sector management and operational capabilities to provide waste acceptance, and transportation services Issuing a revised draft request for proposals. (RW)* (FULLY SUCCESSFUL) • *Completing a revised Policy and Procedure for implementation of Section 180 of the Nuclear Waste Policy Act. (RW)* (FULLY SUCCESSFUL)	**EQ5-1 CONTINUING WITH YUCCA MOUNTAIN SITE CHARACTERIZATION** • *Publish a draft Environmental Impact Statement (EIS). The Nuclear Waste Policy Act requires a Final EIS to accompany the site recommendation (RW)* • *Complete repository and waste package design inputs for use in total system performance assessment for the repository license application. (RW)* • *Complete peer review of the total system performance assessment to provide formal, independent evaluation and critique. (RW)* **EQ5-2 DEVELOPING WASTE ACCEPTANCE AND TRANSPORTATION CAPABILITY** • ~~*Develop enhancements and modifications to the Standard Disposal Contract to support procurement of waste acceptance and transportation services (RW)*~~ [20]	**EQ5-1 CONTINUING WITH YUCCA MOUNTAIN SITE CHARACTERIZATION** • *Issue a Final Environmental Impact Statement as required by the Nuclear Waste Policy Act. (This also meets a milestone in a FMFIA corrective action plan) (RW)* • *Select the reference design for site recommendation and license application. (RW)* • *Select the reference natural systems models for site recommendation and license application. (RW)* **EQ5-2** [Combined with EQ5-1]

[20] Because of ongoing litigation concerning spent fuel acceptance, this performance goal has been delayed. It will be resumed upon resolution of pending legal issues

Means & Strategies for FY 2000: The Department will focus the Civilian Radioactive Waste Management Program on the activities necessary to determine the suitability of the Yucca Mountain site as a repository, develop the documentation needed for a Secretarial decision on the Site Recommendation to the President in FY 2001, and on other activities associated with the Federal government's waste acceptance obligations

EQ-6 Reduce the life-cycle costs of environmental cleanup. (EM, NE)

Long-term Strategies: Over the next several years, the Department will (1) significantly enhance performance, increase efficiency and reduce costs; (2) develop and deploy innovative environmental cleanup, nuclear waste, and spent fuel treatment technologies; and (3) reduce operating costs.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ6-1 REDUCING ENVIRONMENTAL CLEANUP COSTS THROUGH ENHANCED PERFORMANCE • *Achieving productivity enhancement targets (Targets to be established as part of the Accelerating Clean-up: Focus on 2006). (EM)* (SUCCESSFUL) • *Increasing the dollar value and/or number of competitively awarded fixed price contracts, including privatization contracts. Continuing the development of the privatization strategy by: (EM)* - *Awarding the Oak Ridge Transuranic Waste Treatment Privatization contract;* - *Authorizing commencement of the Tank Waste Remediation System (TWRS) contract Phase 1B at Hanford Site in Washington; and* - *Awarding the Carlsbad Area Office Contact-Handled Transuranic Waste Transportation Privatization Contract.* (SUCCESSFUL)	**EQ6-1 REDUCING ENVIRONMENTAL CLEANUP COSTS THROUGH ENHANCED PERFORMANCE** • *Continue the development and implementation of the privatization strategy by: (EM)* - *Commencing Phase II (Design completion and facility construction) of the Idaho National Engineering and Environmental Laboratory (INEEL) Advanced Mixed Waste Treatment Project (AMWTP);* - *Awarding the contract for the INEEL Spent Nuclear Fuel (SNF) Dry Storage Project; and* - *Awarding the contract for the Oak Ridge Waste Disposal Project (Design completion/ construction/operation).*	**EQ6-1 ACHIEVING ENHANCED PERFORMANCE, INCREASED EFFICIENCY AND REDUCED COSTS** • *Continue the development and implementation of the privatization strategy by:* - *Achieving the Authorization To Proceed decision for the construction and operations phase (Phase B2) of the Tank Waste Remediation System (TWRS) contract at Hanford Site (EM)*

EQ-6 Reduce the life-cycle costs of environmental cleanup. (EM, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ6-2 DEVELOPING AND DEPLOYING INNOVATIVE CLEANUP TECHNOLOGIES • *Accomplishing 49 innovative technology deployments. (EM)* (FULLY SUCCESSFUL) • *Demonstrating 35 alternative technology systems that meet the performance-specification based needs as identified by the Site Technology Coordinating Groups (STCG). (EM)* (FULLY SUCCESSFUL) • *Making 40 alternative technology systems available for implementation with full cost and engineering performance data. (EM)* (FULLY SUCCESSFUL) • *Completing the final Programmatic Environmental Impact Statement for selecting the long-term management strategy for the depleted UF6. (NE)* (SUCCESSFUL)	**EQ6-2 DEVELOPING AND DEPLOYING INNOVATIVE CLEANUP TECHNOLOGIES** • *Accomplish 60 innovative technology deployments. (EM)* • *Demonstrate 22 alternative technology systems that meet the performance-specification based needs as identified by the Site Technology Coordination Groups. (EM)* • *Make 40 alternative technology systems ready for implementation with cost and engineering performance data. (EM)* • *Complete the demonstration of the electrometallurgical spent fuel treatment technology by the end of FY 1999 using Experimental Breeder Reactor-II (EBR-II) spent nuclear fuel.(NE)* • *Complete the conversion and disposition of 100 percent of the secondary sodium coolant from the Experimental Breeder Reactor-II and 40 percent of the Fermi reactor sodium coolant in storage at Argonne National Laboratory-West. (NE)* • *Maintain the Fast Flux Test Facility in a safe, environmentally-compliant standby condition to permit implementation of an anticipated Secretarial decision in FY 1999 to deactivate or pursue potential restart to support a range of national research reactor requirements. (NE)*	**EQ6-2 DEVELOPING AND DEPLOYING INNOVATIVE CLEANUP TECHNOLOGIES** • *Accomplish 60 [21] innovative technology deployments. (EM)* • *Demonstrate 30 alternative technology systems that meet the performance-specification based needs as identified by the Site Technology Coordination Groups. (EM)* • *Make 30 alternative technology systems ready for implementation with cost and engineering performance data. (EM)* • *Meet all Federal and State safety and environmental requirements for the Fast Flux Test Facility while implementing a Secretarial decision on the facility. (NE)* • *Complete the draining and processing of EBR-II primary sodium (NE)* • *Complete a National Environmental Policy Act (NEPA) review on the use of electrometallurgical technology to treat EBR-II and other sodium-bonded fuel in the Department's problem spent fuel. (NE)* • *Through the NEPA decision-making process, establish and begin implementing a long-term strategy for the management of the Department's depleted uranium hexafluoride inventories. (NE)*

[21] A goal of 60 technology deployments is established based on the current rate of deployments Historically, it has proven difficult to accurately quantify longer-term performance goals for deployments. This is due to the nature of the technology work scope and the variations in timing and magnitude of the deploying program's work scope.

EQ-6 Reduce the life-cycle costs of environmental cleanup. (EM, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
	• *Meet all commitments made to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride. (NE)*	• *Meet all commitments made to the Ohio Environmental Protection Agency and the Defense Nuclear Facilities Safety Board to ensure the safety of the Department's inventory of depleted uranium hexafluoride. (NE)* • *Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. (NE)* • *Complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research. (NE)*
EQ6-3 COMPLETING DEACTIVATION OF SURPLUS FACILITIES • *Completing about 60 surplus facility deactivations. (EM)* (FULLY SUCCESSFUL)	**EQ6-3 COMPLETING DEACTIVATION OF SURPLUS FACILITIES** • *Complete about 65 surplus facility deactivations. (EM)*	**EQ6-3 COMPLETING DEACTIVATION OF SURPLUS FACILITIES** • *Completing about 60 surplus facility deactivations. (EM)*

Means & Strategies for FY 2000: The Department will continue to seek "performance enhancements" as a means of reducing the significant costs of the cleanup program By becoming more cost-efficient, the Department will be able to accelerate cleanup and closure schedules, and thereby lower life-cycle cleanup costs. The Department has established accelerated site closure targets for the Rocky Flats Environmental Technology Site (from 2010 to 2006), Fernald Environmental Management Project (from 2008 to 2005), and Mound (from 2005 to 2004). In *Accelerating Cleanup: Paths to Closure*, the Department identified several ways to enhance performance to improve productivity and/or accelerate site closure:

Application of Technology Deployment – Introducing less expensive and/or more effective cleanup technologies,

Integration – Identifying better ways to transfer and manage wastes among sites;

Project Sequencing – Completing projects with high "upkeep" costs;

Reducing Support Costs – Applying more funds to cleanup;

Contract Reform – Creating incentives for contractors to improve performance (quality results and accelerated completion), and

Lessons Learned – Increasing productivity based on lessons learned.

The Department will also · (1) reduce operating costs by continuing deactivation of surplus nuclear facilities and placing them :n a radiologically and industrially safe shutdown condition; (2) reduce the disposition cost of depleted uranium by exploring and developing alternative government uses for the materials; (3) perform depleted uranium hexafluoride cylinder maintenance activities that are protective of workers and the environment; and (4) work in cooperation with other Federal and State agencies to determine acceptable cleanup strategies and to define appropriate end point criteria for cleanup activities. The Department will conduct facility surveillance and maintenance activities to ensure there is· (1) no degradation of key plant systems; (2) retention of authorized basis and configuration control; (3) maintenance of key staffing, qualifications, and training; and (4) compliance with Federal and State safety and environmental regulations

EQ-7 Maximize the beneficial reuse of land & facilities and effectively control risks from residual contamination. (EM, FM)

Long-term Strategy: Over the next several years, the Department will, in conjunction with stakeholders, develop comprehensive land use plans for DOE sites that provide information on alternative uses, ownership, environmental requirements, and implementation schedules and ensure environmental remedies remain protective.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
EQ7-1 MAKING DOE LANDS AND FACILITIES AVAILABLE FOR OTHER USES • *Submitting to Congress a future use plan for DOE sites, and an analysis of related long-term stewardship issues by October 1998. The plan and analysis will include the Hanford Site, Savannah River Site, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory. (EM)* (SUCCESSFUL) • *Initiating disposition of thirty percent of land and facilities identified as excess by the mission justification analysis. (FM)* (SUCCESSFUL)	**EQ7-1 MAKING DOE LANDS AND FACILITIES AVAILABLE FOR OTHER USES** • *Release a background report on Long-term Stewardship ("Moving from Cleanup to Stewardship") by the second quarter of FY 1999. This report was one of the commitments published in the June 1998 Paths to Closure document. (EM)* • *Begin the formal study on long-term stewardship pursuant to the 1998 Programmatic Environmental Impact Statement (PEIS) settlement agreement, which requires a public scoping and comment process; and complete the scoping process portion of the study. (EM)* • *Complete mission justification analysis for land and facilities at 5 of the remaining 15 sites. (FM)*	**EQ7-1 MAKING DOE LANDS AND FACILITIES AVAILABLE FOR OTHER USES** • *Produce the draft study on long-term stewardship pursuant to the 1998 PEIS settlement agreement by March 31, 2000. (EM)* • *Complete a disposition schedule for all non-contaminated real property (including facilities), identified in the Facility Information Management System (FIMS) as "excess" as of October 1, 1999 (FM)* **EQ7-2 ENSURING ENVIRONMENTAL REMEDIES REMAIN PROTECTIVE FOR THE LONG-TERM** • *Continue coordination with the National Academy of Sciences/National Research Council on the release of their analyses on long-term stewardship ("closure"). (EM)* • *Improve the integration of long-term stewardship issues with project baselines in the revision to "Accelerating Cleanup: Paths to Closure", to include developing baseline information for stewardship at each site. (EM)*

Means & Strategies for FY 2000: The Department will continue to work with state and federal regulatory agencies, as well as Indian tribes, local governments and community organizations on formulating environmental cleanup remedies that consider future land use. The Department will develop a program initiative to accelerate the cleanup of lands by applying technologies to recover useful lands for transfer to the private sector In addition, the Department will seek to encourage beneficial reuse of land by coordinating with the Environmental Protection Agency (EPA) brown fields initiative and sharing lessons learned with the Department of Defense (DOD) Baseline Realignment and Closure (BRAC) process. The Department will also develop a framework for a long-term stewardship program, including resources for site personnel on data retention, institutional controls and remedy selection consideration.

SCIENCE AND TECHNOLOGY

GOAL: Deliver the scientific understanding and technological innovations that are critical to the success of DOE's mission and the Nation's science base.

The Department, through the programs of the Office of Science (SC), funds basic research in order to advance the fundamental science knowledge base, as well as train future scientists. Research of this type has been supported by the Department of Energy and its predecessors for over 40 years and includes research in:

- basic energy sciences research in materials and chemical sciences, engineering and geosciences, and energy biosciences;
- magnetic fusion energy;
- health and environmental research;
- high energy and nuclear physics;
- computational and technology research in mathematical, informational, and computational sciences.

These research programs build the science and technology base for our Nation's energy security and scientific leadership.

Access to a broad variety of facilities and laboratories is essential to success in our research efforts. The facilities include large accelerators, experimental detectors, and reactors, high-precision instruments, synchrotrons, massively parallel computers, high-capacity networks, and high-resolution microscopes. These facilities are used by a broad base of user groups from universities and industries all over the country and abroad.

The knowledge, techniques, and instruments developed in the diverse programs of the Office of Science contribute to U.S. economic and national defense security, and are used in therapeutic and diagnostic medical applications, electricity generation, and an array of applications in industry and other scientific areas.

The following table maps the Presidential Budget's Program and Financing (P&F) accounts and program activities to the Department of Energy's offices and decision units. The alignment includes aggregation, disaggregation, and consolidation. The next table maps DOE decision units to the business line objectives where performance measures and goals are identified.

Presidential Budget Program and Financing (P&F) Accounts and Program Activities		*FY 2000 Budget Request ($M)*	*DOE Office*	*DOE Decision Units*
250 Energy Programs				
Science				
	High energy physics	$697	SC	High Energy Physics
	Nuclear physics	$343	SC	Nuclear Physics
	Biological and environmental research	$411	SC	Biological & Environmental Research
	Basic energy sciences	$888	SC	Basic Energy Sciences
	Computational and technology research	$199	SC	Computational & Technology Research
	Energy research analyses	$1	SC	Energy Research Analysis
	Multiprogram energy labs--facility support	$21	SC	Multiprogram energy labs--facility support
	Fusion energy sciences	$223	SC	Fusion Energy Sciences
	Program direction	$52	SC	Program Direction
270 Energy Supply				
	Technical Information Management	$9	SC	Technical Information Management
270 Energy Supply [22]		$269	NE	Nuclear Energy

[22] Only a portion of Energy Supply resources are applied to the Science & Technology Business Line

The following table indicates which budget program/decision units support which of the business line objectives. Resources, in both funds and Full Time Equivalent staff (FTEs), are shown. FTE estimates are for the overall program offices. The funds shown are program totals from DOE's budget request.

DOE Office	Program/ Decision Unit	FY 1999 Budget Request ($M)	FTEs	ST-1 Long Term Science	ST-2 Leading-Edge Technologies	ST-3 Management of Science	ST-4 Science Education
SC	High Energy Physics	$697	424	X	X	X	
	Nuclear Physics	$343		X		X	
	Biological & Environmental Research	$411		X	X	X	
	Basic Energy Sciences	$888		X	X	X	
	Computational & Technology Research	$199		X	X	X	
	Energy Research Analyses	$1		X	X		
	Multiprogram Energy labs--Facility Support	$21		X	X		
	Fusion Energy Science Program	$223		X	X	X	
	Program Direction	$52		X	X	X	X
	Technical Information Management	$9			X		
NE	Nuclear Energy [23]	$269	144		X		X

[23] Only a portion of Nuclear Energy resources are applied to the Environmental Quality Business Line.

ST-1 Develop the science that underlies DOE's long-term mission. (SC)

Long-term Strategies: Over the next several years, the Department will (1) conduct relevant, high quality, innovative research that responds to the needs of the DOE mission, (2) provide new insights into the fundamental nature of energy and matter; (3) search for and utilize the best talent from all sources to perform DOE research; (4) develop science to support DOE's participation in energy and other National policy formulations; (5) support emerging sciences that are important to the future of DOE and the Nation, including interdisciplinary research that addresses the Nation's most pressing problems; and (6) leverage research opportunities through science partnerships and pursue international science collaborations.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST1-1 PURSUING INNOVATIVE RESEARCH RELEVANT TO DOE'S MISSION • *Maintaining the high quality and relevance of DOE's science as evaluated by annual peer reviews and advisory committees. (SC)* (FULLY SUCCESSFUL)[24] • *Completing initial clinical trials of Boron Neutron Capture Therapy to evaluate its safety and feasibility as an alternative method of treating cancers that resist conventional methods of treatment. (SC)* (FULLY SUCCESSFUL) • *Initiating a new Climate Change Technology program that will underpin new opportunities and technologies in carbon capture.(SC)* (FULLY SUCCESSFUL) • *Advancing the state of human genome research by reducing cost and increasing speed and quality of DNA sequencing, and submitting 20 million subunits of finished human and mouse DNA sequence to publicly accessible databases. (SC)* (FULLY SUCCESSFUL)	**ST1-1 CONDUCTING RELEVANT, HIGH QUALITY, INNOVATIVE RESEARCH THAT RESPONDS TO THE NEEDS OF THE DOE MISSION** • *Complete sequencing of 30 million subunits and draft sequence of 30 million additional subunits of human DNA for submission to publicly accessible databases. (SC)* • *Maintain optimum operating schedules at major scientific user facilities to serve thousands of researchers from universities, national laboratories, and industry. (SC)* • *Complete preparations and begin operation of the newly completed B-factory at the Stanford Linear Accelerator Center and the Tevatron at Fermilab. (SC)*	**ST1-1 CONDUCTING RELEVANT, HIGH QUALITY, INNOVATIVE RESEARCH THAT RESPONDS TO THE NEEDS OF THE DOE MISSION** • *Complete the sequencing of 50 million subunits of human DNA to submit to publicly accessible databases in FY 2000. (SC)* • *Maintain the high quality and relevance of DOE's science as evaluated by annual peer reviews and advisory committees. (SC)* • *Maintain optimum operating schedules at major scientific user facilities to serve thousands of researchers from universities, national laboratories, and industry while operating time lost at such user facilities due to unscheduled downtime is less than 10 percent of the total scheduled possible operating time, on average. (SC)* • *Keep the development and upgrade of scientific facilities (including experimental stations) on schedule and with in cost, not exceeding 110 percent of estimates. (SC)*

[24] End-of-year results of FY 1998 Performance Agreement commitments are classified as "FULLY SUCCESSFUL", "SUCCESSFUL", "PARTIALLY SUCCESSFUL", or "UNSUCCESSFUL" for performance judged to be effectively 100% or better, 80-100%, 50-80%, or less than 50% respectively.

ST-1 Develop the science that underlies DOE's long-term mission. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST1-2 FURTHERING OUR KNOWLEDGE OF ENERGY AND MATTER • *Commencing full operation of all 3 experimental halls at the Thomas Jefferson National Accelerator Facility to explore the structure of atomic nuclei. (SC)* (FULLY SUCCESSFUL) • *Commencing research in collaboration with international research community, at the new Sudbury Neutrino Observatory (SNO) in Ontario, Canada to understand why neutrino detection from the sun is much less than expected. (SC)* (FULLY SUCCESSFUL)	**ST1-2 PROVIDING NEW INSIGHTS INTO THE FUNDAMENTAL NATURE OF ENERGY AND MATTER** • *Complete construction and begin operation of the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory. (SC)* • *Deliver on the 1999 US/DOE commitments to the international Large Hadron Collider project (SC)*	**ST1-2 PROVIDING NEW INSIGHTS INTO THE FUNDAMENTAL NATURE OF ENERGY AND MATTER** • *Move the newly upgraded D-Zero and CDF detectors at Fermilab into position in the Main Injector tunnel and begin commissioning in the third quarter of the fiscal year. (SC)* • *Further the progress on achieving luminosity and operational efficiency for the Tevtron at Fermilab in its new mode of operation with the recently completed Main Injector. (SC)* • *Advance knowledge from experiments at the Relativistic Heavy Ion Collider to see possible evidence of the predicted quark-gluon plasma; a high temperature, high density state of nuclear matter that may have existed a millionth of a second after the "Big Bang" (SC)* • *Complete and make available for use via the web a new energy transport code framework, based on modern computing techniques (SC)* • *Operate the B-factory at the Stanford Linear Accelerator Center, the Main Injector for the Tevatron at Fermilab, the Thomas Jefferson National Accelerator Facility, and the Relativistic Heavy Ion Collider at Brookhaven National Laboratory, and deliver on the FY 2000 U S /DOE commitments to the international Large Hadron Collider project. (SC)*

ST-1 Develop the science that underlies DOE's long-term mission. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST1-3 IDENTIFYING AND EMPLOYING THE BEST SCIENTIFIC TALENT • *Establishing partnerships for Academic-Industrial Research (PAIR) Program to enhance opportunities for research partnerships between academic researchers, their students, and industrial researchers. (SC)* (FULLY SUCCESSFUL)	**ST1-3 SEARCHING FOR AND UTILIZE THE BEST TALENT FROM ALL SOURCES TO PERFORM DOE RESEARCH** • *Complete a search for and name Directors of the Argonne National Laboratory, Fermi National Accelerator Laboratory, and Stanford Linear Accelerator Center. (SC)*	**ST1-3 SEARCHING FOR AND UTILIZE THE BEST TALENT FROM ALL SOURCES TO PERFORM DOE RESEARCH** • *Continue Partnerships for Academic-Industrial Research where peer reviewed grants are awarded to university researchers for fundamental, high-risk work jointly defined by the academic and industrial research partners.* • *Begin new funding opportunities in basic plasma sciences and junior plasma physics facility development programs provided through competitive announcements.* • *Review at least 80 percent of the research projects by appropriate peers and select through a merit-based competitive process.*
ST1-4 PROVIDING SCIENCE TO SUPPORT NATIONAL POLICY MAKING • *Developing a comprehensive Departmental policy for laboratory technology transfer in order to leverage science and technology for our nation's economic competitiveness with a stronger partnership with the private sector. (SC)* (PARTIALLY SUCCESSFUL: A position paper proposing principles, criteria, and roles and responsibilities for DOE technology partnership activities was prepared and has been circulated. Policy implications have been discussed with the laboratory directors.)	**ST1-4 DEVELOPING SCIENCE TO SUPPORT DOE'S PARTICIPATION IN ENERGY AND OTHER NATIONAL POLICY FORMULATIONS** • *Determine 70 percent of the DNA sequence of 10 additional microbes with potential use in waste cleanup or energy production. (SC)* • *Initiate a new joint Biological and Environmental Research-Basic Energy Sciences program in fundamental science that will underpin new opportunities and technologies in carbon capture. (SC)* • *Continue collaborative efforts with NASA on space science and exploration. (SC)*	**ST1-4 DEVELOPING SCIENCE TO SUPPORT DOE'S PARTICIPATION IN ENERGY AND OTHER NATIONAL POLICY FORMULATIONS** • *Proceed on the development of the next generation coupled ocean-atmosphere climate model, leading to better information for assessing climate change and variability at regional, rather than global scales. This next generation model will change grid size from the current 300-500 kilometers on a side to less than 200 kilometers on a side. (SC)* • *Continue collaborative efforts with NASA on space science and exploration (SC)* • *Complete the genetic sequencing of over 10 additional microbes with significant potential for waste cleanup and energy production. (SC)*

ST-1 Develop the science that underlies DOE's long-term mission. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
		• *Develop and implement, in cooperation with Basic Energy Sciences, a comprehensive program within the Climate Change Technology Initiative where the focus areas are those that promise the maximum impact in the area of carbon management in addition to supporting fundamental research that address other diverse aspects of the problem. (SC)*
ST1-5 SUPPORTING RESEARCH COLLABORATIONS IN EMERGING AND INTERDISCIPLINARY AREAS • *Applying advances in instrument miniaturization, computational data processing, and molecular and structural biology to advance the development of highly sensitive medical imaging systems used in the detection of diseases. (SC)* (FULLY SUCCESSFUL)	**ST1-5 SUPPORTING EMERGING SCIENCES THAT ARE IMPORTANT TO THE FUTURE OF DOE AND THE NATION** • *Discover new biological structures with more than 60 percent of the new biological structures published in the peer-reviewed literature resulting from data generated as part of the structural biology synchrotron user station program. (SC)* • *Conduct, with at least 75 patients, Boron Neutron Capture Therapy (BNCT) Research Phase I/II clinical trials at reactor sources with neutrons. (SC)* • *Initiate change-out of the beryllium reflector at the High Flux Isotope Reactor at Oak Ridge National Laboratory and improvements to the facility's beam tubes and monochromators. (SC)*	**ST1-5 SUPPORTING EMERGING SCIENCES THAT ARE IMPORTANT TO THE FUTURE OF DOE AND THE NATION** • *Determine the molecular structures of proteins with more than 60 percent of the new structures that are published in the peer reviewed literature resulting from data generated at synchrotron user stations by BER structural biology program. (SC)* • *Complete Phase I/II clinical trials of BNCT at reactor sources of neutrons for at least 100 patients, and development of an additional medical reactor at McClellan Air Force Base-University of California at Davis. (SC)* • *Operate the National Spherical Torus Experiment with a national research team demonstrating long pulse (greater than 1 second) operation at plasma currents approaching 1 megampere, a factor of 40 increase over current exploratory level spherical torus experiments. (SC)*

ST-1 Develop the science that underlies DOE's long-term mission. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST1-6 LEVERAGING RESOURCES THROUGH INTERNATIONAL COLLABORATIONS ON SCIENCE PROJECTS • *Signing the international agreement to participate in the construction and management of the Large Hadron Collider accelerator and the two major detectors. (SC)* (FULLY SUCCESSFUL) • *Completing the memorandum of understanding with the National Science Foundation concerning the management of the U.S. Large Hadron Collider activities. (SC)* (FULLY SUCCESSFUL) • *Completing and transmitting to Congress a Strategic Plan for U.S. International Collaborations in Fusion Science and Technology Research fulfilling a House Science Committee requirement. (SC)* (FULLY SUCCESSFUL) • *Reaching an agreement on the first annual program of bilateral fusion activities between U.S. and Korea.* (SC) (FULLY SUCCESSFUL)	**ST1-6 LEVERAGING RESEARCH OPPORTUNITIES** • *Conduct five intensive operations periods at the Atmospheric Radiation Measurement (ARM) Southern Great Plains site and redeploy an atmospheric radiation and cloud station from the Arctic Ocean to Atqasuk, Alaska. (SC)* • *Provide advanced simulations of possible climate response to increasing atmospheric concentrations of greenhouse gases at subcontinental spatial scales. (SC)* • *Restructure the technology program sub-element in the Fusion Energy Science Program to focus on domestic fusion program needs while maintaining strategic participation in international collaborative activities.* [25] *(SC)* <moved from ER-5>	**ST1-6 LEVERAGING RESEARCH OPPORTUNITIES** • *Coordinate with other federal agencies, Canada and Brazil to maximize national and international capabilities to enhance understanding of the current global carbon dioxide distribution and the role of the terrestrial biosphere in that distribution. (SC)* • *Develop collaborative partnerships between strong marine sciences research institutions and those with developing capabilities to advance innovative techniques in modern molecular biology to understand the coupling between carbon and nitrogen cycles in costal waters and sediments. (SC)* • *Make operational three innovative concept exploration experiments in fusion science-- The LSX field-reversed configuration and the flow-through Z pinch, both at the University of Washington and the Pegasus quast-spherical toroidal plasma at the Wisconsin-- providing basic scientific understanding of relevant concept phenomena. (SC)*

[25] The fusion program was moved from the Energy Resources business line based on Congressional budget structure changes.

ST-1 Develop the science that underlies DOE's long-term mission. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Completing the review of proposals and initiating projects in FY 1998 to design and develop advanced catalysts, electrodes, and membranes, as well as advanced separator plates and high temperature sealants under the Russian-American Fuel Cell Consortium. (PO)* (FULLY SUCCESSFUL) • *Continuing cooperative research efforts with Russia, begun in 1973, on fundamental properties of matter, fusion energy science, nuclear reactor safety, environmental restoration and nuclear waste management by renewing the existing umbrella Peaceful Uses of Atomic Energy Agreement (PUAE), which will expire December 1998, for 12-18 months and beginning negotiations of a new and expanded PUAE Agreement. (PO)* (PARTIALLY SUCCESSFUL: The Russians did not sign the agreement but MOUs are working)		• *In cooperation with NASA, NSF, USDA/Forest Service, and the Smithsonian Institution, provide quantitative data on the annual exchange of carbon dioxide between the atmosphere and terrestrial ecosystem from 25 AmeriFlux sites representing major types of ecosystem and land uses in North and Central America. Provide data on environmental factors, such as climate variation, on the net sequestration or release of carbon dioxide and the role of biophysical processes controlling the net exchange. (SC)*

Means & Strategies for FY 2000: The Department will obtain major new fundamental knowledge by fostering and supporting fundamental, innovative peer-reviewed research to create new scientific and engineering knowledge in areas of basic energy sciences, advanced computing research, a science base for the fusion energy option, the fundamental understanding of energy and matter, and the environmental consequences of energy production and use.

ST-2 Deliver leading-edge technologies that are critical to the DOE mission and the Nation. (SC, NE)

Long-term Strategies: Over the next several years, the Department will (1) develop the technologies required to meet DOE's energy, national security, and environmental quality goals; and (2) pursue technology research partnerships with industry, academia and other government agencies and proactively accelerate the transition of technologies to end users.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST2-1 DEVELOPING DOE MISSION CRITICAL TECHNOLOGIES • *Establishing cost and schedule baselines for the three components (ATLAS Detector, CMS Detector and LHC Accelerator) of the planned US contribution to the Large Hadron Collider as specified in the DOE/NSF/CERN Agreement. (SC)* (FULLY SUCCESSFUL) • *Executing a multi-year contract for development of highly efficient radioisotope power systems in support of NASA's future mission requirements. (NE)* (FULLY SUCCESSFUL) • *Completing 80 percent of the Sandia Hot Cell Facility construction modifications and processing equipment installation activities needed to achieve the facility capability to process 100 percent of the U.S. demand for molybdenum-99. (NE)* (FULLY SUCCESSFUL) • *Supplying quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintaining 95 percent on-time deliveries in FY 1998 and beyond. (NE)* (FULLY SUCCESSFUL)	**ST2-1 DEVELOPING THE TECHNOLOGIES TO MEET DOE'S ENERGY, NATIONAL SECURITY, AND ENVIRONMENTAL GOALS** • *Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. (NE)* • *Initiate construction and commissioning of the Los Alamos Target Irradiation Station, to improve isotope quality with greater operating efficiency. (NE)* • *Complete equipment installation necessary for an emergency backup supply of molybdenum-99, issue a request for proposals to privatize molybdenum-99 production and business activities by May 1999, and after evaluation, award a contract by September 1999 to the most qualified firm. (NE)* • *Develop the Advanced Computational Testing and Simulation Toolkit so that simulation can be used in place of experiments which are too dangerous, expensive, inaccessible, or politically unacceptable. (SC)*	**ST2-1 DEVELOPING THE TECHNOLOGIES TO MEET DOE'S ENERGY, NATIONAL SECURITY, AND ENVIRONMENTAL GOALS** • *Complete an Environmental Impact Statement and establish a Record of Decision on whether to proceed to develop a domestic plutonium-238 production capability for future space missions. (NE)* • *Supply quality stable and radioactive isotopes for industrial, research, and medical applications that continue to meet customer specifications and maintain 95 percent on-time deliveries. (NE)* • *Complete at least 60 percent of the construction of the Los Alamos Target Irradiation Station, which is needed for the production of short-lived isotopes for medical research. (NE)* • *Complete privatization activities associated with production and sale of commercial isotopes. (NE)* • *Implement the Advanced Nuclear Medicine Initiative by providing isotopes or financial assistance for up to five researchers. (NE)*

ST-2 Deliver leading-edge technologies that are critical to the DOE mission and the Nation. (SC, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
		• *Develop advanced computing capabilities, computational algorithms, models, methods, and libraries, and advanced visualization and data management systems to enable new computing applications to science (SC)* • *Continue to fabricate, assemble, and operate premier supercomputer and networking facilities that serve researchers at national laboratories, universities and industry enabling understanding of complex problems and effective integration of geographically distributed teams in national collaborations. (SC)* • *Continue the Natural and Accelerated Bioremediation Research (NABIR) program support fundamental research in environmental and molecular sciences that will underpin the development of bioremediation for containing hazardous waste and cleaning DOE sites. Site characterization of the first NABIR Field Research Center will proceed, and activities necessary to enable research sample distribution to investigators will commence (SC)*

ST-2 Deliver leading-edge technologies that are critical to the DOE mission and the Nation. (SC, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST2-2 PURSUING PARTNERSHIPS TO DEVELOP AND DEPLOY NEW TECHNOLOGIES • *Initiating 15 multi-year Laboratory Technology Research projects by April 1998 that address the Department's top priorities for science and technology, and are cost-shared with industry partners. (SC)* (FULLY SUCCESSFUL) • *Review and select for Phase II follow-on funding approximately 80 Small Business Innovative Research proposals that satisfied proof of concept under Phase I funding, and select approximately 200 proposals for Phase I funding. (SC)* (FULLY SUCCESSFUL)	**ST2-2 PURSUING TECHNOLOGY RESEARCH PARTNERSHIPS** • *Provide fundamental research in environmental sciences, biology, molecular sciences, and computational modeling that will underpin the cleanup of contaminated sites. (SC)* • *Complete the initial SC/EM Pilot Collaborative Research Program and, in cooperation with EM, initiate development of the most promising cleanup technologies arising from these projects. (SC)*	**ST2-2 PURSUING TECHNOLOGY RESEARCH PARTNERSHIPS** • *Initiate about 7 Laboratory Technology Research projects that address the Department's top priorities for science and technology, through cost-shared research partnerships with industry. (SC)* • *Review and select for Phase II funding approximately 80 Small Business Innovation Research (SBIR) proposals that satisfy proof of concept under Phase I funding. In a separate competition, select about 200 SBIR proposals for Phase I funding. (SC)*

Means & Strategies for FY 2000: The Department will develop the technologies required to meet DOE's energy, national security, and environmental quality goals by partnering with research institutions, universities, and closely coordinating with other federal agencies. The Department will also: (1) develop, demonstrate, test, and deliver advanced radioisotope power systems for space and national security missions; and, (2) develop new or improved isotope products and services that enable medical diagnoses and therapy, and other applications that are in the national interest, and encourage private sector investment in new isotope production ventures and sell or lease facilities and inventories for commercial purposes. The Department's Office of Nuclear Energy, Science and Technology will work with the Office of Science and Oak Ridge National Laboratory to develop a firm operating reactor schedule with early warning indicators to allow for coordination of alternative suppliers, if needed, to maintain on-time isotope deliveries. The Department will also identify, fund, and perform site maintenance, construction upgrade projects, and environmental compliance activities in accordance with DOE, Federal, and State requirements.

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ST-3 Improve the management of DOE's research enterprise to enhance the delivery of leading-edge science and technology at reduced costs. (SC)

Long-term Strategies: Over the next several years, the Department will (1) manage the National Laboratories, science-user facilities, and other DOE research providers and research facilities in a more integrated, responsive, and cost-effective way, building on unique core strengths and corresponding roles; (2) design, construct, and operate research facilities in a timely and cost-effective manner; (3) improve the management, dissemination, sharing, and use of scientific and technical information across DOE; and (4) improve peer and program review processes.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST3-1 MANAGING THE DEPARTMENT'S NATIONAL LABORATORIES AND RESEARCH FACILITIES • *Completing a facilities roadmap which will determine the needs and provide direction to the scientific facilities through the year 2020. (SC)* (FULLY SUCCESSFUL) • *Reducing laboratory operating costs by an additional $330 million (relative to FY 1994) without reducing research outputs. This will be applied to the goal of saving $1.4 billion by FY 2000. (SC)* (FULLY SUCCESSFUL) • *Completing Critical Decision II and issuing the draft Environmental Impact Statement (EIS) to initiate construction of the Spallation Neutron Source. (SC)* (FULLY SUCCESSFUL) • *Completing the agreed upon ITER Engineering Design Activities and reaching an agreement on whether to continue into the three-year transition phase leading to construction decision. (SC)* (SUCCESSFUL)	**ST3-1 MANAGING THE NATIONAL LABORATORIES, SCIENCE-USER FACILITIES, AND OTHER DOE RESEARCH PROVIDERS AND RESEARCH FACILITIES** • *Begin Title I design activities, initiate subcontracts and long-lead procurements, and continue R&D work necessary to begin construction activities of the Spallation Neutron Source. (SC)* • *Complete prototype development of a "virtual laboratory" approach and implement at least three program trial applications. (SC)* • *Organize a national research team for the National Spherical Torus Experiment (NSTX) project at Princeton Plasma Physics Laboratory, begin experimental operations by June 1999, and complete the project by September 1999. (SC)* • *Receive from the Program Advisory Committees (PACS), an assessment, of the quality of research and program relevance at major Fusion Energy operating facilities. (SC)*	**ST3-1 MANAGING THE NATIONAL LABORATORIES, SCIENCE-USER FACILITIES, AND OTHER DOE RESEARCH PROVIDERS AND RESEARCH FACILITIES** • *Continue construction of the Spallation Neutron Source, at cost and timetables as contained in the Critical Decision II agreement, to provide beams of neutrons used to probe and understand the physical, chemical, and biological properties of materials at an atomic level leading to better fibers, plastics, catalysts, and magnets and improvements in pharmaceuticals, computing equipment, and electric motors. (SC)* • *Continue fabrication of instrumentation for the short-pulse spallation source at the Manual Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center. (SC)* • *Commence full operation at three Atmospheric Radiation Measurement sites, providing unique climatological data necessary to improve climate prediction for use in energy policy development. (SC)*

ST-3 Improve the management of DOE's research enterprise to enhance the delivery of leading-edge science and technology at reduced costs. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Beginning assembly and installation of the National Spherical Tokomak Experiment at Princeton Plasma Physics Laboratory in FY 1998. (SC)* (FULLY SUCCESSFUL) • *Preserving a U. S. leadership role for the utilization of synchrotron facilities by providing increased user support personnel for beam lines at the National Synchrotron Light Source at Brookhaven National Laboratory (SC).* (FULLY SUCCESSFUL) • *Making progress at the following new research facilities: (SC)* - *B-factory at Stanford Linear Accelerator Center: begin operations;* - *Main Injector at Fermilab: complete construction and begin commissioning;* - *High Flux Beam Reactor at Brookhaven: Initiate EIS;* - *Joint Genome Institute's Production Sequencing Facility: begin operations; and* - *William R. Wiley Environmental Molecular Sciences Laboratory (EMSL): begin operations.* (FULLY SUCCESSFUL) **ST3-2** [Combined with ST3-1]	• *Accomplish the milestone of the FMFIA corrective action plan to complete corrective actions identified in the DOE Action Plan for Improved Management of Brookhaven National Laboratory. (SC)* **ST3-2** [Combined with ST3-1]	• *Continue Atmospheric Radiation Measurement (ARM) accomplishments by conducting five intensive operations periods at the ARM Southern Great Plains site. Data will be obtained from the second station on the North Slope of Alaska. The third station in the Tropical Western Pacific, on Christmas Island, will become operational. (SC)* • *Operate the DIII-D Tokamak facility to test the feasibility of using increased radio frequency heating power and improved power exhaust capabilities to extend the pulse length of advanced operating modes, a requirement for future fusion energy sources. (SC)* • *Provide accountability for at least 95 percent of the required deliverables resulting from the Department's direct contract R&D agreements through the Technical Information Monitoring System (TIMS). (SC)* **ST3-2** [Combined with ST3-1]

ST-3 Improve the management of DOE's research enterprise to enhance the delivery of leading-edge science and technology at reduced costs. (SC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST3-3 MANAGING THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION • *Negotiating and implementing an agreement with the U S. Government Printing Office to provide electronic public access to over 25,000 full-text reports containing scientific and technical information through the DOE Information Bridge. (SC)* (FULLY SUCCESSFUL)	**ST3-3 IMPROVING THE MANAGEMENT, DISSEMINATION, SHARING, AND USE OF SCIENTIFIC AND TECHNICAL INFORMATION ACROSS DOE** • *Conduct a user satisfaction survey to demonstrate that at least 75 percent are satisfied or very satisfied with our computer facilities and networks. (SC)* • *Implement a common distributed electronic infrastructure across DOE that effectively provides researchers and the public timely access to the Department's scientific and technical information. (SC)* • *Implement streamlined policies and procedures for managing the Department's scientific and technical information, using decentralized sources in a cost effective and efficient manner. (SC)*	**ST3-3 IMPROVING THE MANAGEMENT, DISSEMINATION, SHARING, AND USE OF SCIENTIFIC AND TECHNICAL INFORMATION ACROSS DOE** • *Meet 75 percent of the requirements of computer facilities and networks users. (SC)* • *Continue to make available electronic journals at the desktop, and implement tools to facilitate electronic assess to DOE's scientific and technical information. (SC)* • *Link information resources throughout the DOE complex to allow access and use via a single user inquirer, and capitalize on bibliographic information and search tools to facilitate access to full-text journal literature. (SC)*
ST3-4 IMPROVING THE EVALUATION PROCESS FOR DOE'S RESEARCH PROGRAMS • *Having programs reviewed by independent advisory committees to analyze issues and recommend research direction, specifically completion by the: (SC)* - *Energy Science Advisory Committee, of a review of the advanced fusion materials program by September 1998, and* - *High Energy Physics Advisory Panel, of a Plan for the Future of U.S. High Energy Physics.* (FULLY SUCCESSFUL)	**ST3-4 IMPROVING PEER AND PROGRAM REVIEW PROCESSES** • *Maintain high scientific quality in the Energy Research Program as judged by the Program Advisory Committees. (SC)* • *Receive from the National Research Council, an assessment, of the quality of science in the Fusion Energy Sciences research programs. (SC)*	**ST3-4 IMPROVING PEER AND PROGRAM REVIEW PROCESSES** • *Maintain high scientific quality in the Energy Research Program as judged by the Program Advisory Committees. (SC)*

Means & Strategies for FY 2000: The Department will manage the National Laboratories, scientific-user facilities, and other DOE research providers and research facilities in a more integrated, responsive, and cost-effective way, building on unique core strengths and corresponding roles. It will plan for, construct and build premier research facilities that will serve researchers at universities, national laboratories, and industrial laboratories that advance the acquisition of scientific knowledge.

ST-4 Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy. (SC, NE)

Long-term Strategies: Over the next several years, the Department will (1) develop and promote technologies and programs that deliver information and contribute to learning in science, math, engineering and technology, and in general, expand access to DOE's technical information; and (2) leverage DOE's human and physical research infrastructure, working with the National Science Foundation and other Federal agencies, to promote science awareness, enable advanced educational research opportunities, build capabilities at educational institutions, and improve educational opportunities for diverse groups.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
ST4-1 CONTRIBUTING TO THE NATION'S SCIENCE AND MATH EDUCATION AND PROMOTING SCIENCE AWARENESS • *Expanding sponsorship of collaborations for local and regional science awareness events. (SC)* (FULLY SUCCESSFUL) • *Supporting young outstanding scientists through: (SC)* - *Department's minority colleges and universities (MC&U) program - support for at least teams of faculty and students;* - *Hollaender Distinguished post doctoral fellowship program - support for at least eight postdoctoral students;* - *Multi-agency Significant Opportunities in Atmospheric Research and Science (SOARS) Program - support for at least two students;* - *Continuing the Departmental award program for Junior investigators in Plasma Science; and* - *Department's outstanding Junior Investigator program which provides research opportunities for early-career high energy physicists.* (FULLY SUCCESSFUL)	**ST4-1 DEVELOPING AND PROMOTING TECHNOLOGIES AND PROGRAMS THAT DELIVER INFORMATION AND CONTRIBUTE TO LEARNING SCIENCE, MATH, ENGINEERING AND TECHNOLOGY** • *Provide web-based access to energy-related scientific and technical information obtained by DOE via interagency, U.S. businesses and industry, and international agreements, exchanges, and partnerships. (SC)* • *Continue to make 2 to 10 appointments each in the Biological and Environmental Research program's Alexander Hollander Distinguished Post Doctoral Fellowship; the multi-agency SOARS Program (Significant Opportunities in Atmospheric Research and Science) for outstanding Hispanic, Native American, and African American students in the atmospheric and related sciences. (SC)* • *Initiate a Significant Opportunities Program in the broader sciences of global change for outstanding undergraduate and graduate students. (SC)*	**ST4-1 DEVELOPING AND PROMOTING TECHNOLOGIES AND PROGRAMS THAT DELIVER INFORMATION AND CONTRIBUTE TO LEARNING SCIENCE, MATH, ENGINEERING AND TECHNOLOGY** • *Establish customer feedback mechanisms to assess and improve DOE's information program and related products and services, and partner with other government and private sector entities to improve the ease-of- use of systems. (SC)* • *Continue The Global Change Research Education Program will continue to support graduate and undergraduate students conducting DOE-related global change research. It will continue to participate in the multi-agency "Significant Opportunities in Atmospheric Research and Science" Program (SOARS). (SC)* • *Make 4 to 10 appointments in both the BER Alexander Hollaender Distinguished Post Doctoral Fellowship Program and the Historical Black Colleges and Universities Faculty and Student Research Programs for research across all areas of the BER program. (SC)*

ST-4 Use DOE assets as part of an Administration-wide effort to advance the Nation's science education and literacy. (SC, NE) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
	• *Support U.S. universities' nuclear energy research and education capabilities by: (NE)* - *Providing fresh fuel to all university reactors requesting this service;* - *Funding at least 20 universities with research reactors for reactor upgrades and improvements;* - *Partnering with 19 or more private companies to fund DOE/Industry Matching Grants Programs for universities;* - *Increasing the funding for Reactor Sharing by 40 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.* • *Attract outstanding U.S. students to pursue nuclear engineering degrees by: (NE)* - *Increasing the number of fellowships from 14 to 22;* - *Increasing the number of Nuclear Engineering Education Grants from 19 to over 40;* -- *Providing summer on-the-job training to 29 junior and senior nuclear engineering scholarship recipients.*	• *Support U.S. universities' nuclear energy research and education capabilities by:(NE)* - *Providing fresh fuel to all university reactors requesting this service;* - *Funding at least 23 universities with research reactors for reactor upgrades and improvements;* - *Partnering with 17 or more private companies to fund DOE/Industry Matching Grants Programs for universities;* - *Increasing the funding for Reactor Sharing by 20 percent over FY 1998, enabling each of the 26 schools involved in the program to improve the use of their reactors for teaching, training, and education within the surrounding community.* • *Attract outstanding U.S. students to pursue nuclear engineering degrees by: (NE)* - *Providing 18 fellowships;* - *Increasing the number of Nuclear Engineering Education Grants to 45 existing and new grants;* -- *Providing summer on-the-job training to 25 junior and senior nuclear engineering scholarship recipients.*
ST4-2 [Combined with ST4-1]	**ST4-2** [Combined with ST4-1]	**ST4-2** [Combined with ST4-1]

Means & Strategies for FY 2000: The Department will develop and promote technologies and programs that deliver information and contribute to learning in science, math, engineering and technology, and in general expand access to DOE's technical information. The Department will also support and promote university, college, and pre-college technology programs that deliver information and contribute to learning in nuclear science and engineering education, enable advanced educational research opportunities, build capabilities at educational institutions, and improve educational opportunities for diverse groups.

CORPORATE MANAGEMENT

GOAL: The Department of Energy will strive to demonstrate organizational excellence in its environment, safety and health practices, in its communication and trust efforts, and in its corporate management systems and approaches.

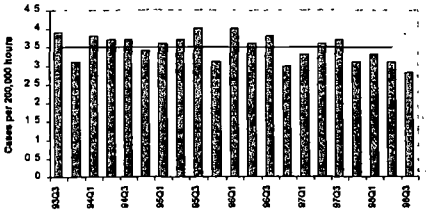

Figure 8: DOE's Total Recordable Case Rate under OSHA Requirements (Industry average is 7.1)

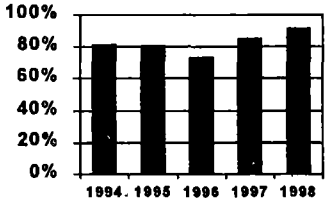

Figure 9: Percentage of DOE's Contracts Awarded Competitively (in contract dollars)

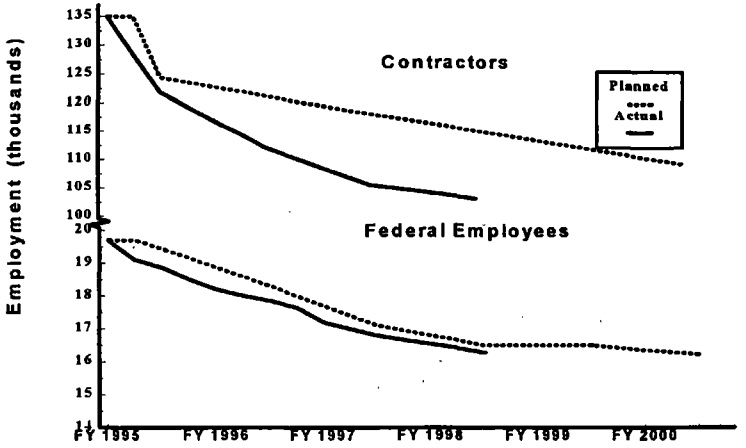

Figure 2: DOE's Human Resources (includes PMAs and FERC)

Department of Energy Annual Performance Plan for FY 2000

The following table maps the Presidential Budget's Program and Financing (P&F) accounts and program activities to the Department of Energy's offices and decision units. The alignment includes aggregation, disaggregation, and consolidation. The table that follows this one maps DOE decision units to the business line objectives where performance measures and goals are identified.

Presidential Budget Program and Financing (P&F) Accounts and Program Activities	*FY 2000 Budget Request ($M)*	*DOE Office*	*DOE Decision Units*
Departmental Administration			
Departmental Administration			
Office of Policy	$21	PO	Policy Office
Chief Financial Officer	$23	CFO	Chief Financial Officer
Congressional and Intergovernmental Affairs	$5	CI	Congressional and Intergovernmental Affairs
General Counsel	$21	GC	General Counsel
Office of the Secretary	$5	S1	Office of the Secretary
Board of Contact Appeals	$1	HG	Hearings and Appeals
Management and Administration	$115	MA	Management and Administration
Field Management	$8	FM	Field Management
Economic Impact and Diversity	$7	ED	Economic Impact and Diversity
Office of Public Affairs	$4	PA	Public Affairs
Contract Reform and Privatization	$3	PC	Contract Reform and Privatization
Economic Regulation	$2	HG	Hearings and Appeals
Office of the Inspector General	$30	IG	Inspector General
270 Energy Supply			
Oak Ridge Landlord	$12	FM	Oak Ridge Landlord
Field Operations	$102	FM	Field Operations
050 Other Defense Activities			
Hearings and Appeals	$3	HG	Hearings and Appeals
Non-defense Environmental Management [26]	$221	EM	Site Closure Fund
Energy Supply [26]	$51	EH	Environment, Safety & Health
Other Defense Activities [26]	$92	EH	Environment, Safety & Health (defense)
	$748	NN	Nonproliferation and National Security

[26] Only a portion of Non-defense Environmental Management and Other Defense Activities resources are applied to the Corporate Management Business Line

The following table indicates which budget program/decision units support which of the business line objectives. Resources, in both funds and Full Time Equivalent staff (FTEs), are shown. FTE estimates are for the overall program offices. The funds shown are program totals from DOE's budget request.

DOE Office	DOE Program/ Decision Unit	FY 2000 Budget Request ($M)	FTEs	CM-1 Safety & Health	CM-2 Neighbor & Partner	CM-3 Efficient & Effective	CM-4 Business Practices	CM-5 Info Tech	CM-6 Evaluation
PO	Policy	$21	120			X			
CFO	Chief Financial Officer	$23	208			X	X		X
CI	Congressional and Intergovernmental Affairs	$5	40		X				
GC	General Counsel	$21	164			X			
S1	Office of the Secretary	$5	40	X	X				X
HG	Board of Contract Appeals	$1	46				X		
	Hearings and Appeals (Other Defense Activities)	$3					X		
	Hearings and Appeals (Economic Regulations)	$2					X		
MA	Management and Administration	$115	593	X	X	X		X	
FM	Field Management	$8	927	X	X	X			
	Oak Ridge Landlord	$12		X	X	X			
	Field Operations	$102		X	X	X			
ED	Economic Impact and Diversity	$7	42		X	X			
PA	Public Affairs	$4	31		X				
IG	Inspector General	$30	257						X
CP	Contract Reform and Privatization	$3	7				X		
EM	Non-defense Environmental Management [27]	$211	2,697		X				
EH	Environment, Safety & Health (defense) [27]	$92	339	X					
EH	Environment, Safety & Health [27]	$51		X					
NN	Nonproliferation and National Security [27]	$748	374		X				

Strategic objective CM-3 has been broken up into four objectives to provide appropriate emphasis to the efforts of contract reform, information technology, etc. The original strategies have been maintained as follows:

Original CM-3 Strategy:	New Location/Objective:
CM3-1, 3, 4, & 7	CM3-1, 2, 3, 4
CM3-2 & 5	CM4-1, 2
CM3-6	CM5-1
CM3-8	Moved to NS-3
CM3-9	CM6-1

[27] Only a portion of EM, EH, and NN resources are applied to the Corporate Management Business Line.

CM-1 Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities. (EH, ED, MA)

Long-term Strategies: Over the next several years, the Department will (1) integrate and embed sound environment, safety, and health (ES&H) management practices into the performance of DOE's day-to-day work; (2) clearly identify and fund ES&H priorities and ensure resources are appropriately spent on those priorities, (3) ensure that all DOE employees are appropriately trained and technically competent commensurate with their ES&H responsibilities; and (4) work with the Nuclear Regulatory Commission and the Occupational Safety and Health Administration to evaluate the costs and benefits of independent external regulation of safety and health.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM1-1 INSTITUTING A SOUND ES&H CULTURE	**CM1-1 INSTITUTING A SOUND ES&H CULTURE**	**CM1-1 INSTITUTING A SOUND ES&H CULTURE**
• *Preventing fatalities, serious accidents, and environmental releases at Departmental sites.(EH)* (SUCCESSFUL)[28]	• *Prevent fatalities, serious accidents, and environmental releases at Departmental sites. (EH)*	• *Establish Departmental goals that ensure a positive trend in preventing fatalities, serious accidents, and environmental releases at Departmental sites. (EH)*
• *Initiating Integrated Safety Management Systems at all 10 high priority facilities by April 1998. (EH)* (FULLY SUCCESSFUL)	• *Implement Integrated Safety Management Systems in all major management and operations contracts. (EH)*	• *Through independent oversight, provide information and analysis of the effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, and safeguards and security policies and programs to the Secretary and senior line management. (EH)*
• *Completing documentation of ES&H roles and responsibilities for all appropriate DOE offices and sites by July 1998. (EH)* (PARTIALLY SUCCESSFUL: Potential conflicts took until after FY 1998 to be resolved.)	• *Provide expanded access to information on health related risks from operating our facilities to ensure that minority and low-income populations, which may be disproportionately adversely impacted by DOE facilities, understand the Department's environmental justice goals and strategies. (ED)*	• *Provide medical screening to all DOE workers formerly exposed to beryllium during their employment at DOE facilities. (EH)*
• *Publishing guidance for incorporating environmental justice principles into the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) implementation process. (EH/ED)* (SUCCESSFUL)	• *Conduct oversight special reviews, assessments, evaluations, and inspections of such topics as emergency management, safety management, accidents, and safeguards and security. (EH)*	• *Develop a stronger, more coherent public health agenda at and surrounding DOE sites. (EH)*
	• *Prepare a draft Department of Energy implementation plan for the Administration's Clean Water Initiative. (EH)*[29]	• *Accomplish the milestone of the FMFIA corrective action plan to complete the nuclear safety standards upgrade project. (EH)*

[28] End-of-year results of FY 1998 Performance Agreement commitments are classified as "FULLY SUCCESSFUL", "SUCCESSFUL", "PARTIALLY SUCCESSFUL", or "UNSUCCESSFUL" for performance judged to be effectively 100% or better, 80-100%, 50-80%, or less than 50% respectively Concerning this specific measure, DOE had one work-related fatality during FY 1998 However, DOE's work-related fatality record for FY 1998 was the lowest rate since FY 1994 and was therefore considered "SUCCESSFUL"

[29] Adds an Administration priority announced in FY 1998.

CM-1 Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities. (EH, ED, MA) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Through independent oversight, provide information and analysis of the effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, and safeguards and security policies and programs to the Secretary and senior line management. (EH)* (FULLY SUCCESSFUL) • *Completing an additional four needs assessments to continue building the basis for a more detailed program of medical surveillance, in order to address the health risks to former DOE workers. (EH)* (FULLY SUCCESSFUL)		• *Implement the environmental justice philosophy into DOE's operational activities by: (ED)* - *achieving at least 15 percent increased level of community interaction at DOE's public meetings over 1998 participation,* - *developing specific criteria for evaluating effective implementation of environmental justice principles of DOE's M&O Contractors,* - *achieving at least 10 percent increased clean-up of hazardous wastes in communities impacted by DOE's operations over 1999 levels.*
CM1-2 ENSURING DOE PROGRAMS APPROPRIATELY ADDRESS ES&H PRIORITIES • *Beginning to annually monitor and report on ES&H expenditures and improve related internal controls. (EH)* (FULLY SUCCESSFUL)	**CM1-2** [combined with CM1-1]	**CM1-2** [combined with CM1-1]
CM1-3 ENSURING EMPLOYEES ARE QUALIFIED IN THEIR ES&H RESPONSIBILITIES • *Making progress on implementing the Technical Qualifications Program, by increasing the percentage of employees who are certified from 65% in FY 1997 to 75% in FY 1998, towards a goal of 90% of the 1750 covered employees by FY 2000. (MA)* (SUCCESSFUL)	**CM1-3 ENSURING EMPLOYEES ARE QUALIFIED IN THEIR ES&H RESPONSIBILITIES** • *Improve Federal technical workforce capabilities at defense sites by implementing the FY 1999 milestones of the Revised Implementation Plan for DNFSB Recommendation 93-3. (MA)*	**CM1-3 ENSURING EMPLOYEES ARE QUALIFIED IN THEIR ES&H RESPONSIBILITIES** • *Improve Federal technical workforce capabilities at defense sites by implementing the FY 2000 milestones of the Revised Implementation Plan for DNFSB Recommendation 93-3. (MA)*

CM-1 Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities. (EH, ED, MA) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM1-4 INVESTIGATING FEASIBILITY OF INDEPENDENT EXTERNAL OVERSIGHT OF SAFETY AND HEALTH AT DOE SITES	**CM1-4 INVESTIGATING FEASIBILITY OF INDEPENDENT EXTERNAL OVERSIGHT OF SAFETY AND HEALTH AT DOE SITES**	**CM1-4 INVESTIGATING FEASIBILITY OF INDEPENDENT EXTERNAL OVERSIGHT OF SAFETY AND HEALTH AT DOE SITES**
• *Conducting three NRC/DOE pilot projects to assess the DOE facilities against the standards that NRC believes would be appropriate to ensure radiological safety. (EH)* (FULLY SUCCESSFUL)	• *Complete the ongoing pilot program which assesses the DOE facilities against the standards that the NRC believes would be appropriate to ensure radiological safety. (EH)*	• *Support regulatory transition of legislatively designated sites, accomplish necessary planning for appropriate classes of DOE facilities to be regulated, and report to Congress on the status of regulatory transition. (EH)*

Means & Strategies for FY 2000: The Department will continue to monitor the health of its workforce, and where necessary, take steps to intervene where adverse health impacts are identified. The Department, through its ongoing worker health surveillance programs, has identified that the rate of chronic beryllium disease (CBD) among beryllium-exposed employees has not declined over time despite the fact that the Department facilities have operated within existing occupational exposure limits. In response to these findings, DOE has drafted a Notice of Proposed Rulemaking establishing a DOE-wide Chronic Beryllium Disease Prevention Program which will be implemented during FY 2000. In addition, the DOE has embarked on a program to provide medical screening to all DOE workers formerly exposed to beryllium during their employment at DOE facilities to identify both sensitization to beryllium and CBD. Under this program, periodic follow-up surveillance will be provided to those found to be sensitized. By 2000, this program will be implemented at all 20 DOE sites where workers were exposed to beryllium.

In conjunction with Department of Health and Human Services (DHHS), developing a stronger, more coherent public health agenda at and surrounding DOE sites that is responsive to worker and community health concerns, leads to a clear understanding of the health impacts of DOE operations, and results in improved health protection and prevention for workers and communities.

The Department , NRC, OSHA, and other affected agencies will work with Congress to establish a plan to externally regulate safety and health at appropriate classes of DOE facilities, with a transition period of 5 to 10 years after the enactment of enabling legislation, while maintaining a robust internal safety and health management program.

CM-2 As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner. (MA, ED, FM, EM, NN, CI, S1)

Long-term Strategies: Over the next several years, the Department will (1) foster strong partnerships with neighboring DOE communities, regulators, and other stakeholders to determine priorities and solutions; (2) increase customer and public awareness of DOE's mission areas by improving the quality, timeliness, and sufficiency of information disseminated on the Department's functions, successes, lessons learned, and future activities; and (3) increase openness with the public by prudently declassifying information about the Department's activities while maintaining a balance with the Nation's security.

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM2-1 INVOLVING STAKEHOLDERS IN THE POLICY-MAKING • *Performing an analysis of public participation training needs at all 11 Operations/Field Offices, and initiating a public participation training program for Headquarters and field managers to enhance stakeholder involvement in DOE decisions. (EM)* (FULLY SUCCESSFUL) • *Conducting a series of regional and national stakeholder workshops to increase public involvement in crosscutting EM issues. The workshops will be attended by advisory board members, state and local governments, Native American Tribes, and other stakeholders across the country.(EM)* (SUCCESSFUL) • *Responding to an estimated total of 500,000 public requests for information and documents from the Center for Environmental Management Information within an average of two business days per request. (EM)* (FULLY SUCCESSFUL)	**CM2-1 INVOLVING STAKEHOLDERS IN THE POLICY-MAKING** • *Conduct stakeholder meetings to increase public involvement in crosscutting environmental quality issues. The meeting participants will include advisory board members, state and local governments, Native American Tribes, and other stakeholders across the country. (EM)* • *Conduct "Communicating with the Public" training sessions for DOE managers (EM)* • *Respond to an estimated total of 500,000 public requests for information and documents from the Center for Environmental Management Information within an average of two business days per request. (EM)*	**CM2-1 INVOLVING STAKEHOLDERS IN THE POLICY-MAKING** • *Conduct stakeholder meetings to increase public involvement in crosscutting environmental quality issues. The meeting participants will include advisory board members, state and local governments, Native American Tribes, and other stakeholders across the country. (EM)* • *Respond to an estimated total of 500,000 public requests for information and documents from the Center for Environmental Management Information within an average of two business days per request. (EM)*

CM-2 As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner. (MA, ED, FM, EM, NN, CI, S1) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM2-2 IMPROVING COMMUNICATIONS WITH CUSTOMERS AND THE PUBLIC • *Reducing the Freedom of Information Act backlog by 15 percent and the average case age by 25 percent. (MA)* (SUCCESSFUL) • *Improving the quality and volume of information on DOE's World Wide Web site as indicated by user-interest through numbers of home page visits. (MA)* (FULLY SUCCESSFUL)	**CM2-2 IMPROVING COMMUNICATIONS WITH CUSTOMERS AND THE PUBLIC** • *Reduce the Freedom of Information Act backlog by 10 percent and the average case age by 10 percent over the previous year. (MA)* • *Improve the quality and volume of information on the DOE's World Wide Web site and demonstrate user-interest through a higher number of home page visits (hits) per year. (MA)*	**CM2-2 IMPROVING COMMUNICATIONS WITH CUSTOMERS AND THE PUBLIC** • *Reduce the Freedom of Information Act backlog by 10 percent and the average case age by 10 percent over the previous year. (MA)*
CM2-3 INCREASING OPENNESS WITH THE PUBLIC • *Reviewing for possible declassification and release, 3,950,000 pages of DOE documents under Executive Order 12958 bringing the total pages reviewed to 8,460,000 which is 60 percent of the DOE's historically significant records 25 years or older. (NN)* (PARTIALLY SUCCESSFUL: Unanticipated Congressional budget reductions and application of resources to litigation caused less than intended results.) • *Implementing "National Security Information, Classification and Declassification" (Title 10 Code of Federal Regulations, Part 1045) through conducting two on-site reviews of other agency Restricted Data programs. (NN)* (UNSUCCESSFUL: "Outreach Coordinator" resigned)	**CM2-3 INCREASING OPENNESS WITH THE PUBLIC** • *Continue reviewing DOE documents for possible declassification and release of those that no longer need to be withheld for security purposes.*[30] *(NN)* • *Implement the fundamental Classification Policy Review recommendations and issue 40 classification guides in the streamlined format containing the updated guidance. (NN)* • *Implement 10 CFR 1045 through reviewing 100 percent of other agency classification guides submitted, and by conducting five on-site reviews of other agency Restricted Data Programs. (NN)*	**CM2-3 INCREASING OPENNESS WITH THE PUBLIC** • *Continue reviewing DOE documents for possible declassification and release of those that no longer need to be withheld for security purposes. (NN)* • *Implement the fundamental Classification Policy Review recommendations and issue 40 classification guides in the streamlined format containing the updated guidance. (NN)*

[30] The National Defense Authorization Act for FY-1999 Section 3161 (the Kyl amendment) creates requirements for review of classified documents that make it impossible to make any estimates for specific number of pages to be reviewed

CM-2 As a good neighbor and public partner, continually work with customers and stakeholders in an open, frank, and constructive manner. (MA, ED, FM, EM, NN, CI, S1) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
	CM2-4 DEVELOPING A PUBLIC HEALTH AGENDA FOR DOE SITES • *Issue an initial status report on the development of a public health agenda by December 31, 1998 and a final public health agenda for each site, which reflects customer and stakeholder input, shall be issued by September 30, 1998. (EH)*	

Means & Strategies for FY 2000: The Department will continue reviewing classified records for possible release using revised classification guides and continue improvements to the processing of FOIA requests.

CM-3 Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs. (CFO, PO, MA, ED, GC)

Long-term Strategies: Over the next several years, the Department will (1) improve decision-making, ensure accountability, maximize departmental resources, and achieve intended results by corporately managing the Department's mission, functions, and activities; (2) continue to streamline and improve operations, further reduce overhead expenditures, and facilitate additional workforce reductions while aiding affected employees and communities; (3) implement quality management principles, value diversity, and continue to improve human resources systems and practices; and (4) promote the effective, efficient, and economical operation of the business lines through audits, investigations, inspections, and other reviews. (These were strategies 1,3,4, and 7.)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM3-1 IMPROVING MANAGERIAL PERFORMANCE AND ACCOUNTABILITY • *Utilizing mechanisms such as senior level corporate and business line management councils, a DOE chief operating officer, and performance-based management to foster strategic direction, enhance programmatic integration, and improve headquarters and field operations. (PO)* (PARTIALLY SUCCESSFUL: Cannot demonstrate enhancements.) • *Establishing annual Secretarial Officer Performance Agreements that are linked to the Secretary's Performance Agreement with the President. (PO)* (PARTIALLY SUCCESSFUL: Although some agreements executed, their effectiveness is questionable.) • *Expanding the Corporate Executive Information System to provide senior management at Headquarters and Field Offices with timely and useful management information. (CFO)* (FULLY SUCCESSFUL)	**CM3-1 IMPROVING MANAGERIAL PERFORMANCE AND ACCOUNTABILITY** • *Identify functional and technical system requirements for developing a Business Management Information System (BMIS) with a special emphasis on financial management, and develop business scenarios for its evaluation (a milestone of a FMFIA corrective action plan). (CFO)* • *Develop annual performance-based budgets by using DOE's corporate Strategic Management System to link resource requirements to five-year plans, make independent project validations, and perform cross-cutting program evaluations. (CFO/PO)* • *Conduct self assessments to measure organizational performance in the areas of Customer Satisfaction, Employee Satisfaction, and the achievement of Business Results using the Malcolm Baldrige, President's or Energy Quality Award Criteria. (MA)*	**CM3-1 IMPROVING MANAGERIAL PERFORMANCE AND ACCOUNTABILITY** • *Initiate development/ acquisition of a modern, comprehensive Business Management Information System - Financial Management (BMIS-FM) to replace the Department's financial management system by awarding a contract to acquire/develop core financial systems and related modules (a milestone of a FMFIA corrective action plan). (CFO)* • *Develop annual performance-based budgets by using DOE's corporate Strategic Management System to link resource requirements to five-year plans, make independent project validations, and perform cross-cutting program evaluations. (CFO/PO)* • *Utilize DOE's corporate Strategic Management System to link resource requirements to five-year plans, making independent project validations, and performing cross-cutting program evaluations (PO/CFO)*

CM-3 Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs. (CFO, PO, MA, ED, GC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Developing annual performance-based budgets by using DOE's corporate Strategic Management System to link resource requirements to five-year plans, make independent project validations, and perform cross-cutting program evaluations. (CFO/PO)* (PARTIALLY SUCCESSFUL: Budgets were developed but five-year planning issues were only partially used.)	• ~~*Have every Energy Efficiency/ Renewable Energy program developing progress milestones and estimates of energy-related program benefits annually and at least 25 percent of the milestones and estimated benefits undergoing external peer review each year with a goal of having all milestones and estimated benefits being peer-reviewed at least once every four years. (EE)*~~ <moved to ER-3>	
CM3-2 CONTINUING THE STRATEGIC ALIGNMENT INITIATIVES TO STREAMLINE AND RE-ENGINEER (was CM3-3)	**CM3-2 CONTINUING INITIATIVES TO STREAMLINE AND RE-ENGINEER THE DEPARTMENT**	**CM3-2 CONTINUING THE INITIATIVES TO STREAMLINE AND RE-ENGINEER THE DEPARTMENT**
• *Realizing annual Strategic Alignment Initiative savings commitments totaling $1.7 billion by the end of FY 2000 by:* - *Achieving DOE staffing target of 10,874 by the end of FY 1998, a reduction of 294 FTEs from the FY 1997 end-of-year level (MA)* - *Consolidating Headquarters personnel into six locations by the end of FY 1998 and achieve $3.8 million savings in rent. (MA)* - *Saving $61 million by reengineering information management business processes. (MA)* - *Reducing technical and support service contracting obligations below $ 610 million. (MA)* - *returning to the Treasury at least $15 million through the sale, transfer, re-use, or disposal of unneeded materials, facilities, land, and other assets. (WT)* (FULLY SUCCESSFUL)	• *Realize annual savings from improved operations to achieve cumulative savings totaling $1.7 billion by the end of FY 2000: (MA)* - *Achieve staffing reductions to achieve Departmental target of 10,613 by the end of FY 1999. (MA)* - *Achieve $65 million in further cost avoidances in information technology. (MA)* - *Reduce support service contracting obligations below $610 million in FY 1999. (MA)* - ~~*Returning to the Treasury at least $15 million annually through the sale, transfer, re-use, or disposal of unneeded materials, facilities, land, and other assets. (WT)*~~[31]	• *Realize annual savings commitments totaling $1.7 billion by the end of FY 2000: (MA)* - *Achieve staffing reductions to achieve Departmental target of 10,269 by the end of FY 2000.* - *Achieve $58 million in further cost avoidances in information technology.*

[31] The program surpassed it's original multi-year, cumulative goal during FY 1998 and was therefore ended by the Secretary

CM-3 Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs. (CFO, PO, MA, ED, GC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM3-3 IMPROVING HUMAN RESOURCE PRACTICES (was CM3-4) • *Hiring 20 Welfare-to-Work recipients by the end of FY 1998 towards the goal of hiring 55 by FY 2000. (MA)* (FULLY SUCCESSFUL) • *Implementing a DOE-wide employee accessible automated personnel system by December 1998. (MA)* (SUCCESSFUL) • *Expanding the use of Alternate Dispute Resolution by 30 percent compared to FY 1997 in mediation of workplace disputes such as EEO complaints and grievances.* (GC) (FULLY SUCCESSFUL) • *Using the Malcolm Baldrige, President's, or Energy Quality Award Criteria, demonstrating continuous organizational improvement by achieving self-assessment scores of at least 300. (MA)* (FULLY SUCCESSFUL)	**CM3-3 IMPROVING HUMAN RESOURCE PRACTICES** • *Continue hiring welfare to work recipients to achieve the Presidential goal of 55, 40 of whom will be hired by the end of FY 1999. (MA)* • *Implement a DOE-wide employee accessible automated personnel system by December 1998. (MA)* • *Expand the use of Alternate Dispute Resolution by 20 percent over the FY 1998 use to mediate workplace disputes such as Equal Employment Opportunity complaints and grievances. (GC)* • *Improve workforce skills and reduce training costs by implementing the FY 1999 milestones in the DOE Corporate Education, Training, and Development Plan. (MA)*	**CM3-3 IMPROVING HUMAN RESOURCE PRACTICES** • *Continue hiring welfare to work recipients to achieve the Presidential goal of 55. (MA)* • *Increase the electronic transfer of personnel documents through implementation of paperless workflow in CHRIS, reducing personnel paper transactions by 15 percent. (MA)* • *Expand the use of Alternate Dispute Resolution by 20 percent over FY 1999 use to mediate workplace disputes such as Equal Employment Opportunity complaints and grievances. (GC)* • *Demonstrate continuous organizational improvement by achieving positive trends as measured by assessments during the Malcolm Baldrige Criteria for Performance Excellence. (MA)* • *Improve workforce skills and reduce training costs by implementing the FY 2000 milestones in the DOE Corporate Education, Training, and Development Plan. (MA)* • *Provide best value, high quality and timely Human Resources and Administration products and services so as to sustain a customer satisfaction level of 90 percent. (MA)*

CM-3 Use efficient and effective corporate management systems and approaches to guide decision making, streamline and improve operations, align resources and reduce costs. (CFO, PO, MA, ED, GC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM3-4 MANAGING DIVERSITY TO ACHIEVE THE DEPARTMENT'S MISSION (was CM3-7) • *Conducting an employee needs survey in order to enhance diversity and determine future strategic direction. (ED)* (PARTIALLY SUCCESSFUL: Survey conducted but determination of future strategic direction not completed.) • *Evaluating contractor plans and performance to assure full implementation of the Diversity Contract Clause. (ED)* (UNSPECIFIED) • *Diversifying America's science workforce by enhancing opportunities for minority educational institutions and increasing their awards by 20 percent over FY 1997. (ED)* (UNSUCCESSFUL: The strategies for promoting this goal were not effective.) ~~**CM3-8 MANAGING CONTRACTOR WORK FORCE RESTRUCTURING**~~ ~~• *Implementing a single Department-wide automated contractor workforce employment data system. (WT)*~~ ~~• *Achieving annual recurring cost savings from separated workers that are at least three times the one time cost of separation. (WT)*~~ ~~• *Supporting local community transition activities that will create 8,000 to 12,000 new private sector jobs by the end of FY 1998. (WT)*~~ <moved to NS-3>	**CM3-4 DEMONSTRATING THE DEPARTMENT'S COMMITMENT TO DIVERSITY BY BECOMING A RECOGNIZED LEADER THE FEDERAL GOVERNMENT** • *Publish in the Code of Federal Regulations, the DOE Mentor-Protégée Program. (ED)* • *Commit to specific procurement strategies that will increase the participation of women-owned small businesses in the Federal marketplace through a Memorandum of Understanding with the Small Business Administration. (ED)* • *Enhance America's science workforce by ensuring that minority-serving institutions are afforded and take advantage of the Federal research, development, education and equipment opportunities for which they are eligible and increase their awards by 5 percent over FY 1998. (ED)* ~~**CM3-8 MANAGING CONTRACTOR WORK FORCE RESTRUCTURING**~~ ~~• *Keep involuntary separations to a range of 30-60 percent of all separations while assuring maintenance of essential work force skills mix and productivity. (WT)*~~ ~~• *Achieve annual recurring costs savings from separated workers that is at least three times the one time cost of separation. (WT)*~~ ~~• *Support local community transition activities that will create 10,000 to 15,000 new private sector jobs by the end of FY 1999. (WT)*~~ <moved to NS-3>	**CM3-4 MODELING DIVERSITY FOR THE NEW MILLENNIUM** • *Increase funding to Minority Educational Institutions by 5 percent over FY 1999 (ED)* • *Provide two technical assistance seminars for disadvantaged businesses to improve their performance n the energy sector of the economy on a regional basis. (ED)*

Means & Strategies for FY 2000: The Department will continue to conduct core financial functions and implement initiatives to achieve greater accountability and enhanced financial control of government operations. The Department will focus on principal financial management functions and financial and business information needs throughout a major project to implement a Business Management Information System (BMIS) that supports integration with other systems, production of audited financial statements and performance reporting.

CM-4 Improve the delivery of products and services through contract reform and the use of business-like management practices. (CFO, PO, MA, FM, GC)

Long-term Strategies: Over the next several years, the Department will (2) use prudent contracting and business management approaches that emphasize results, accountability, and competition, improve timeliness, minimize costs; and ensure customer satisfaction; and (5) strengthen the management of projects, materials, facilities, land, infrastructure, and other assets, to ensure safe, sound, and cost-effective operations, appropriate maintenance of sites, and to ensure intended project results. (These were strategies 2 & 5 for Strategic Plan objective CM-3.)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM4-1 USING PRUDENT CONTRACTING AND BUSINESS MANAGEMENT PRACTICES (was CM3-2) • *Preparing and submitting Department-wide audited financial statement with an unqualified opinion to the Office of Management and Budget by March 1, 1998. (CFO)* (FULLY SUCCESSFUL) • *Increasing the number of competitively awarded contracts for major DOE sites and facilities from 13 to 16 by September 1998. (MA)* (FULLY SUCCESSFUL) • *Converting all management and operating contracts awarded in FY 1998 to performance-based management contracts. (MA)* (FULLY SUCCESSFUL) • *Hiring a privatization director, developing a Department-wide privatization strategy, and identifying and pursuing privatization opportunities.(S-2)* (FULLY SUCCESSFUL)	**CM4-1 USING PRUDENT CONTRACTING AND BUSINESS MANAGEMENT PRACTICES** • *Prepare and publish an annual accountability report that includes the Department-wide audited financial statement with an unqualified opinion to the Office of Management and Budget by March 1999 (CFO/PO)* • *Convert all management and operating contracts awarded in FY 1999 to performance-based management contracts. (MA)* • *Award 50 percent of all management and operating contracts including three M&O contracts that will change to Federal Acquisition Regulation (FAR) contracts during FY 1999 using competitive procedures. (MA)* • *Award 50 percent of all support service contracts in FY 1999 as performance-based service contracts. (MA)* • *Issue a new contractor fee policy by December 1998, as committed to in the Federal Managers' Financial Integrity Act (FMFIA) FY 1997 report. (MA)* • *Conduct a follow-up assessment of the effectiveness of actions taken in response to the recommendations made by the Performance Based Incentive Report, as committed to in the FMFIA FY 1997 report.(MA)*	**CM4-1 USING PRUDENT CONTRACTING AND BUSINESS MANAGEMENT PRACTICES** • *Prepare and publish an annual accountability report that includes the Department-wide audited financial statement with an unqualified opinion to the Office of Management and Budget by March 2000. (CFO/PO)* • *Converting one management and operating contract awarded in FY 2000 to a Performance Based Service Contract (PBSC) using the government-wide standards. (MA)* • *Convert one support services contract at each major site to PBSC using the government-wide standards (MA)* • *Maintain and operate electronic procurement systems installed through FY 1999 to accomplish: (MA)* - *industry interactive procurement processes;* - *electronic procurement system for purchases under $25,000; and* - *paperless procurement actions processing system* • *Achieve 95 percent of contract professionals certified under DOE professional development standards. (MA)*

CM-4 Improve the delivery of products and services through contract reform and the use of business-like management practices. (CFO, PO, MA, FM, GC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
• *Applying business process reengineering to the highest priority procurement processes by September 1998 with a goal of reducing cycle time by 30 percent (MA)* (FULLY SUCCESSFUL) • *Improving Federal procurement and property management employee skills by establishing a contracting workforce development program by September 1998. (MA)* (FULLY SUCCESSFUL) • *Implementing an automated system to track and measure contractor performance by September 1998. (MA)* (FULLY SUCCESSFUL) **CM4-2 APPLYING BUSINESS-LIKE PRACTICES TO MANAGEMENT OF DOE PROJECTS AND ASSETS** (was CM3-5) • *Meeting established project scope, schedule, and cost baselines by adopting systems based on industry and government best project management practices. (FM)* (SUCCESSFUL) • *Conducting annual business management self-assessments to ensure that sites are maximizing their resources and maintaining safe and secure operations. (FM)* (SUCCESSFUL)	**CM4-2 APPLYING BUSINESS-LIKE PRACTICES TO MANAGEMENT OF DOE PROJECTS AND ASSETS** • *Complete four Energy Systems Acquisitions Advisory Board critical actions on required strategic and major systems. (FM)* • *Verify progress against established project scope, schedule, and cost baselines on projects valued at $5 million or more. (FM)* • *Accomplish the milestones of the FMFIA corrective action plan for the Departmental challenge of project management. (FM/DP)* • *Develop a plan by March 1999 to review DOE and contractor litigation cases in state and federal courts for appropriateness of early resolution through mediation. Increase by 20 percent over FY 1998 the number of such cases mediated. Demonstrate estimated savings of 50 percent in litigation costs for those cases settled in mediation as compared to the costs had those cases gone through litigation. (GC)*	**CM4-2 APPLYING BUSINESS-LIKE PRACTICES TO MANAGEMENT OF DOE PROJECTS AND ASSETS** • *Complete the independent project management reviews and forward the applicable reports and Departmental position papers to Congress. (FM)* • *Ensure that maximum efficiency, economy, and reliability are achieved and the savings demonstrated as a result of contract negotiations and regulatory interventions, especially with respect to deregulation within the utility industry. Performance will be measured by cost avoidance greater than at least twice the cost of running the program. (FM)* • *Verify progress against established project scope, schedule, and cost baselines on projects valued at $5 million or more. (FM)* • *Define and pursue innovative strategies for promoting mortgage reduction through dispositioning excess property, including real estate, facilities, and materials. (FM)*

CM-4 Improve the delivery of products and services through contract reform and the use of business-like management practices. (CFO, PO, MA, FM, GC) (Continued)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
		• *Increase by 20% over FY 1999 the number of DOE and contractor litigation cases in state and federal courts settled through mediation, demonstrating estimated savings of 50% in litigation costs for those cases settled in mediation as compared to the costs had those cases gone through litigation. (GC)*

Means & Strategies for FY 2000: The Department will continue the use of performance agreements with the President and use the results of the FY 1999 agreement as the basis of the Department's Accountability Report for FY 1999 due in March 2000. It is intended that this audited report will exceed the requirements for the first annual report under GPRA and build on a record of "clean opinions" from the Inspector General. The Department will also begin to use the government-wide standards for Performance Based Service Contracts in place of DOE's current approach. The Department will contract out to achieve independence in project management reviews and will review and apply more private business practices in the management of its projects and assets.

CM-5 Implement information systems so employees can perform their jobs efficiently and effectively. (MA)

Long-term Strategies: Over the next several years, the Department will utilize, under the auspices of the Chief Information Officer, an integrated Department-wide framework for planning, budgeting, evaluating, and implementing information management requirements to reduce costs and improve operations (Was strategy 6 for Strategic Plan objective CM-3)

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
CM5-1 ENSURING DEPARTMENT'S INFORMATION SYSTEMS ARE BASED ON COST EFFECTIVE TECHNOLOGY SOLUTIONS (Was CM3-6) • *Establishing, by October 1997, the Capital Planning Information Technology Investment Board and operationalize the requirements of the Clinger-Cohen Act of 1996. (MA)* (SUCCESSFUL) • *Starting the implementation of a five-year information management plan and producing annual operational plans as part of the Department's budget process. (MA)* (FULLY SUCCESSFUL) • *Implementing, by January 1998, a Department-wide information architecture with supporting standards to foster $100 million in cost avoidances over the next 5 years. (MA).* (SUCCESSFUL) • *All departmental elements implementing Year 2000 century date change compliant mission-essential computer systems in accordance with the milestones, guidance, and procedures established by the CIO (MA)* (SUCCESSFUL)	**CM5-1 ENSURING DEPARTMENT'S INFORMATION SYSTEMS ARE BASED ON COST EFFECTIVE TECHNOLOGY SOLUTIONS** • *Continue to improve infrastructure to allow staff the capability of accessing and sharing information easily and seamlessly across the DOE complex. (MA)* • *Continuously evolve the Department-wide information architecture with supporting standards to foster $100 million on cost avoidances by FY 2003 (MA)* • *Implement all FY 1999 milestones for year 2000 changes for mission-essential systems. (MA)* • *Develop the Corporate Management Information Program (CMIP) milestone plan and report to Congress (MA)* • *Accomplish the milestones of the FMFIA corrective action plan for the Departmental challenge of unclassified computer security. (MA)*	**CM5-1 ENSURING DEPARTMENT'S INFORMATION SYSTEMS ARE BASED ON COST EFFECTIVE TECHNOLOGY SOLUTIONS** • *Complete all FY 2000 milestones in the CMIP plan. (MA)* • *Satisfy all program office computing/ telecommunications requirements in Working Capital Fund Service agreements. (MA)*

Means & Strategies for FY 2000: The Department will implement milestones using methods to be described in the Corporate Management Information Program (CMIP) and will build on experiences in improving the information architecture to satisfy program office computing/telecommunications requirements.

CM-6 Improve performance through evaluations, reviews, audits, and inspections. (IG, S1, CFO)

Long-term Strategies: Over the next several years, the Department will evaluate management controls and promote the effective, efficient, and economical operation of the business lines through audits, investigations, inspections, and other reviews

FY 1998 Performance Agreement Measures & Goals (with status)	FY 1999 Performance Plan Measures & Goals (Revised Final)	FY 2000 Performance Plan Measures & Goals
Note although not part of the FY 1998 Performance Agreement, the following results are provided for context. • Completed the Consolidated Financial Statement Audit for FY 1997, one of only eight agencies to render a timely unqualified opinion and complete the audit by the statutory deadline of March 1, 1998. (IG) • Surpassed goal of completing or having in process 60 percent of the targeted audits as of the end of the fiscal year by achieving 73 percent (IG) • Achieved acceptance of approximately 70 percent of investigative cases presented for prosecution (IG)	**CM6-1 PROMOTING THE EFFECTIVE, EFFICIENT, AND ECONOMICAL OPERATION OF THE BUSINESS LINES THROUGH AUDITS, INVESTIGATIONS, INSPECTIONS, AND OTHER REVIEWS** (was CM3-9) • *Render, by designated due dates, an opinion annually on the Department's consolidated financial statements, system of internal controls, and compliance with laws and regulations. (IG)* • *Complete at least 60 percent of the audits planned for the year and replace those audits not started with more significant audits which identify time-sensitive issues needing review. (IG)* • *Focus investigations on allegations of serious violations of Federal law by: (IG)* – *Obtaining judicial and/or administrative action on 30 percent of all cases in open status during the fiscal year;* – *Obtaining acceptance of 75 percent of the cases presented for prosecution* • *Plan and, on a timely basis, conduct reviews based on assessment of risk and/or benefit to key Department programs.(IG)*	**CM6-1 PROMOTING THE EFFECTIVE, EFFICIENT, AND ECONOMICAL OPERATION OF THE BUSINESS LINES THROUGH AUDITS, INVESTIGATIONS, INSPECTIONS, AND OTHER REVIEWS** • *Render, by designated due dates, an opinion annually on the Department's consolidated financial statements, system of internal controls, and compliance with laws and regulations (IG)* • *Complete at least 60 percent of the audits planned for the year and replace those audits not started with more significant audits which identify time-sensitive issues needing review. (IG)* • *Focus investigations on allegations of serious violations of Federal law by: (IG)* – *Obtaining judicial and/or administrative action on 35 percent of all cases in open status during the fiscal year;* – *Obtaining acceptance of 75 percent of the cases presented for prosecution.* • *Plan and, on a timely basis, conduct reviews based on assessment of risk and/or benefit to key Department programs.(IG)*

Means & Strategies for FY 2000: The Department will conduct self-assessments and evaluations of management controls within all Departmental elements in accordance with FMFIA. The Department's Inspector General will prioritize audits, investigations, inspections, and other reviews to address those areas of most impact with the limited resources available and will request, through the appropriate budget process, additional audit resources

Resource Requirements

The Department will only achieve its goals and objectives with adequate financial, human, infrastructure, and technical resources.

In developing this plan, the Department projected budget appropriations consistent with the OMB's guidance for budget deficit reduction targets through FY 2002. Federal staffing levels are based upon the Department's Strategic Alignment Initiative targets (targets that do not include the Federal Energy Regulatory Commission and the Power Marketing Administrations) established in 1995. These targets call for an overall federal staff reduction of 27 percent by the end of FY 2000 to a level of 10,269. In addition, DOE will reduce contractor staffing levels to 91,000, a 38 percent reduction from the peak level of 148,686 employed in FY 1992. Additional decreases in budget or staffing levels will adversely impact the Department's ability to meet its commitments. A matrix was presented with each business line displaying the program/decision units that support the business line objectives. Attached is the composite matrix for all business lines showing those programs that support objectives in more than one business line. Additional resource requirements and special programmatic needs are described below.

In the National Security area, replacing nuclear testing with a science-based stewardship and management program will require development of advanced experimental and computational capabilities. Additionally, workforce skills will shift from nuclear weapons design, testing, and analysis to modeling, simulations, and systems analysis. The loss of nuclear expertise through staff aging and attrition will need to be minimized. Construction of the National Ignition Facility and the Dual-Axis Radiographic Hydrodynamic Test Facility will provide new experimental test capabilities. Additionally, a source for tritium will be needed to provide an adequate supply for the enduring nuclear weapon stockpile. New facilities will be required to disassemble and convert surplus plutonium pits and fabricate mixed oxide fuel for burning in existing commercial reactors. Existing or planned high level waste vitrification facilities, coupled with new material preparation facilities, will be required to immobilize surplus weapons plutonium Modifications to existing or planned facilities will be utilized for the long-term storage of surplus fissile materials.

The Environmental Quality cleanup goals and objectives reflect the pressing need to reduce spending in the short term, while reducing both economic and environmental liabilities in the long term. Achievement of the accelerated environmental cleanup goals and objectives is dependent upon receiving stable funding at about the current funding level. In addition, accomplishment of these goals and objectives depends upon effective implementation of a wide array of management initiatives designed to substantially reduce life-cycle costs, improve processes, and enhance performance. These initiatives include reducing support costs, creating the right incentives through performance-based contracting, optimizing project sequencing to reduce fixed costs, privatization and use of private-sector technology and experience, deployment of innovative technology, and benchmarking for process improvement. With regard to civilian radioactive waste, if legislation authorizing interim storage is enacted, substantial additional funding will be required for site-specific construction and procurement of waste acceptance and transportation equipment and services.

In order to meet the Nation's needs for cutting-edge science, DOE will have to periodically replace or make major upgrades to aging or outdated major experimental facilities. These needs will be weighed against the benefits from cost-effective modifications to existing facilities to ensure that the maximum national benefits are derived from existing infrastructure—this recognizes, however, that many of these science facilities have a finite useful life. The Secretary of Energy's Advisory Board has been asked to examine the long-term needs for advanced scientific research facilities to accomplish DOE's Science and Technology objectives.

Major acquisitions of resources that support the delivery of the results proposed for FY 2000 are addressed in the Departments' Capital Assets Plan.

Validation and Verification

Validation and verification of the reported status will be accomplished by periodic guidance, reviews, certifications, and audits. Guidance for the staff making reports and training on reporting and documentation expectations are issued and conducted in the Fall when the staff is reporting on the previous year's results. Our reporting process includes certifications by heads of organizational elements and reviews of records. The data sources are primarily

within the program offices performing the work, the National Laboratories, or our contractors, but we will move toward independent or external sources to ensure objective measurements. The performance reporting process includes internal correspondence issued to heads of Departmental elements requesting the status of performance commitments in the Secretary's performance agreement and emphasizing the importance of ensuring that the information provided was accurate and complete Internal management controls will continue to be applied to ensure the data quality and heads of elements formally certify the accuracy of the data at the end of the year.

In preparing audited financial statements, the Chief Financial Officer and Policy Office will issue guidance and conduct training for Secretarial Officers and their staffs, stressing their roles in the preparation of the financial statements and required management representation letters. Management representation letters attest to the accuracy and reliability of financial information and performance results. As requested by the Secretary, management representation letters will be signed and provided by all heads of Departmental elements responsible for performance commitments in the agreement to the Secretary and included the following attestation on performance measure information: "We acknowledge our responsibility for the fair presentation of the performance measure information presented in the Overview section and the Supplemental Information of the financial statements. We believe this data to be accurate and reliable." This attestation will indicate that each program office is aware of their responsibility for the performance measure data and the necessary validation and support documentation to ensure its accuracy and reliability. The Department will issue guidance and offer training to program offices to clearly delineate their specific roles and responsibilities in the preparation of the financial statements and related program performance reporting in order to ensure that the performance measure reporting structure is sufficient to capture reliable data for future financial statements. The Department will also conduct internal reviews of reported status to assure itself of the validity and veracity of the reported status of the performance measures.

The Department has been using a computer system called SOLOMON to collect and present results and performance assessments for the annual Secretary's Performance Agreement with the President It has been used since the first Performance Agreement for FY 1995. SOLOMON is a World-Wide-Web based system to allow remote data entry, monitoring, and oversight. Data entry is controlled through a password system that provides an auditable record of changes. Program offices and managers directly update results and performance assessments during the year and the end of year information is used for analysis and preparation of the "Accountability Report".

In accordance with the Federal Managers' Financial Integrity Act of 1992, the Department will continue evaluations of its management controls in effect during the fiscal year. Our evaluations include an assessment of whether the management controls of the Department were in compliance with the standards prescribed by the Comptroller General. The purpose of these evaluations is to provide reasonable assurance that the management controls are working effectively, that program and administrative functions including the accuracy and reliability of the reporting of performance results are performed in an economical and efficient manner consistent with applicable laws, and that assets were safeguarded against the potential for waste, fraud, abuse, or mismanagement.

The Department's reporting of performance and financial information has been audited by the Inspector General for the past two years and received an unqualified opinions. However, the Inspector General did note weaknesses in accuracy, validation, and maintenance of data in the system. The most recent audit will be published on March 1st and the Department will address the weaknesses in the FY 1998 reporting that affect performance for FY 2000.

The Department will only use the Inspector General's audit of the financial statements which provides an independent confirmation on the accuracy of the performance measure information in the financial statements, as a second check on the accuracy and reliability of the reported status. The programs are the first line management responsible for their reported results.

Waivers

The Department has requested to be part of the Office of Management and Budget pilot program using an "Accountability Report" to consolidate annual reporting of financial information as allowed by the

Government Management Reform Act of 1994. The Department intends that this annual report will also meet the requirements for an annual performance report in accordance with the Results Act. The Department has made no other request for waivers of administrative requirements to provide managerial flexibility

Next Steps for this Plan

This Performance Plan is a proposal associated with the proposed budget for the Department. Although not required under the Results Act, but allowed by OMB, the Department intends to convert this proposal into a performance agreement once the budget for the Department is signed into law. The Department has developed performance agreements after budgets were enacted since FY 1995. The performance agreement for FY 2000 will resolve differences between the proposed budget and performance plan and the enacted budget. The performance agreement will contain the proposed performance goals of the Annual Performance Plan for those activities that are fully funded and will appropriately adjust those performance goals that are funded at a level different from the proposed budget.

The Department intends to report to the public quarterly on the status of performance as it has with previous performance agreements. Additionally, the Department will report to the Congress annually as required by the Results Act, Government Management Reform Act of 1994, and the DOE Organizational Act of 1977.

Demonstrating Credible Performance

This Performance Plan builds on the experience the Department has gained in collecting and reporting performance data each year since our first Performance Agreement between the Secretary and the President in FY 1995. Since then, we have been collecting performance results data for Secretarial performance measures of success and making them available to our stakeholders. In fact, we demonstrated to the National Performance Review that we were actively tracking our progress on the first agreement before it was even signed. The performance data for FY 1997 is available on our Web site (http://www.doe.gov/policy/sms/sms.html).

In addition, beginning in FY 1996, our results have been subject to independent review by the Department's Inspector General. In the spirit of the recent management reform laws, Government Management Reform Act of 1994, as well as the Government Performance and Results Act of 1993, we began using the results data from the performance measures of the Agreements as the basis of the results reviewed for the financial statements. The first year the Department produced consolidated annual financial reports, FY 1996, which included results of performance compared to performance measures from the Performance Agreement, the IG was able to provide an a unqualified opinion. The same was true for the second year, FY 1997. However, we recognize that our data collection and validation efforts can be improved and intend to make improvements for FY 1999 as we continue to make DOE more productive and accountable to the taxpayers.

Criteria for Annual Performance Plan Performance Measures & Targets

The following criteria guide the development of annual performance measures & targets:

PRESIDENTIAL (1) a significant budgetary obligation, (2) White House interest has been demonstrated, or (3) there is Secretarial intent to raise to it to the Presidential level.

SPECIFIC Plainly state precisely what will be done in this fiscal year.

QUANTIFIED Clearly state the measurement and target level of performance. Naked percentages are too vague without specifying the base--instead, state the from and to levels with an optional percentage.

MEANINGFUL Each commitment must stand alone without knowledge of last year's Agreement or Plan or our performance results to link the measures to the commitment statement. Why it will be done, i.e., the purpose or planned outcome. The "so as to ..." should be clear for each measure.

STRETCHING Should have 80% confidence in meeting target during the fiscal year. Higher confidence is under committing--lower percentages are over committing.

CONCISE Statements of commitments and measures should be short, direct, and to the point. A commitment with measures should be between 5 and 25 lines (i.e., 30 to 125 words). Explanations should not be included. The object is to produce an Agreement that is short enough that it would actually be read.

WRITTEN FOR TAXPAYERS Written in common language and requiring only a newspaper article level of knowledge of DOE and world events.

COVERING The overall Agreement must reasonably represent the whole of the resources we are entrusted to apply to the Department's mission in this fiscal year.

AUDITABLE Each success measure should be based on factual information, so that the IG and/or GAO will be satisfied if they were to do an audit.

DOE Office Designations

The business line objectives and performance measures and goals are annotated with the responsible DOE office(s) in parentheses. The two letter office designations are listed below.

CR	**Chief Financial Officer**
DP	**Defense Programs**
ED	**Economic Impact & Diversity**
EE	**Energy Efficiency & Renewable Energy**
EH	**Environment, Safety & Health**
EIA	**Energy Information Administration**
EM	**Environmental Management**
FE	**Fossil Energy**
FM	**Field Management**
MA	**Management and Administration (formerly Human Resources)**
MD	**Fissile Materials Disposition**
NE	**Nuclear Energy, Science & Technology**
NN	**Nonproliferation & National Security**
NR	**Naval Reactors**
PC	**Privatization and Contract Reform**
PO	**Policy and International Affairs**
PMAs	**Power Marketing Administrations**
RW	**Civilian Radioactive Waste Management**
S1	**Secretary's Office**
SC	**Science (formerly Energy Research)**
WT	**Worker & Community Transition**

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